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The Intramammary Therapy of Bovine Mastitis

This is Report No. 5, published with the approval of the Committee on Animal Health, National Research Council. The report was prepared by a subcommittee composed of R. B. Little, V.M.D. (Chairman), of the Rockefeller Institute; C. S. Bryan, Ph.D., D.V.M., Michigan State College; W. E. Petersen, Ph.D., University of Minnesota; W. N. Plastridge, Ph.D., University of Connecticut; and O. W. Schalm, D.V.M., Ph.D., University of California.

THE PURPOSE of this report is to point out the value and limitations of intramammary therapy and to summarize results obtained in controlled investigations on each of the chemotherapeutic and antibiotic agents available for use in the treatment of bovine mastitis.

Less than a decade ago, all forms of bovine mastitis were considered incurable, but research in recent years has shown that some infections of the bovine udder are vulnerable to treatment by intramammary infusion of certain chemotherapeutic and antibiotic agents. Pharmaceutical companies have been quick to place these products on the market, sometimes before adequate research data were accumulated. The various "mastitis cures" now available commercially are not equally effective and some are decidedly irritating. Promiscuous use without guidance as to choice of agent and without the development of an adequate herd program for mastitis control will lead to disappointment in results obtained and may place mastitis therapy in disrepute among dairymen.

Mastitis is a general term used to designate any inflammatory condition of the udder and, without question, it is the most prevalent disease among dairy cows. Although exact data are not available for every section of the country, it can be stated without exaggeration that a minimum of 1 out of every 4 cows is affected in some degree. The disease is least troublesome in small, well-managed dairies; in larger herds, where chances for its spread are greater and individual attention to cows is often lacking, it has become of prime importance. Financial losses accrue from reduction in quantity and quality of milk, additional labor required for special handling of diseased udders, early slaughter of cows as a result of mammary tissue destruction, and need for raising or purchasing additional replacements.

The primary cause of mastitis is an infection of the udder with pathogenic bacteria. However, injuries, improper milking, exposure to inclement weather, and other faulty management practices play a significant rôle in predisposing the udder to infection or in aggravating the disease after it becomes established. Several species of bacteria have been incriminated as causative agents, but the organisms classified as streptococci are the most important. The specific organism called *Streptococcus agalactiae* is responsible for the majority of cases of the commonly occurring, readily apparent, chronic form of mastitis. By application of available information on diagnosis, prevention of infection, and treatment, *Str. agalactiae* infection can be controlled. In general, investigators agree that from 50 to 90 per cent of udder infections with this organism are curable.

In some herds, staphylococci are found in the milk from as high as 30 to 40 per cent of the cows. The mastitis produced

by these infections is usually so mild that the milker is seldom aware of its presence. In some cows, however, staphylococcal mastitis assumes a more pronounced clinical form which simulates chronic mastitis caused by *Str. agalactiae* and, infrequently, a severe acute mastitis develops. This is characterized by much swelling, pain, scanty, abnormal secretion associated with a generalized toxemia, resulting in loss of appetite and an elevation of body temperature. The affected quarter either becomes gangrenous and drops off or the swelling eventually subsides, leaving a shrunken quarter. In some instances, the toxemia is so severe that death of the cow ensues. Other species of bacteria may cause acute mastitis, but Staphylococcus is the most frequent offender in this form of the disease. Knowledge is limited concerning the origin, the mode of spread, and the methods for control of staphylococcal mastitis. A few research workers have claimed cures against chronic staphylooccal mastitis, but the majority of reports show such infection to be exceedingly difficult to eliminate from the udder.

VALUE AND LIMITATIONS OF MASTITIS THERAPY

The many investigators who have found intramammary therapy an effective weapon against chronic streptococcal mastitis have, with one accord, emphasized the importance of using the procedure only as an adjunct to a well-planned, mastitis-control program based on accurate diagnosis, segregation of infected cows, and the use of sanitary milking practices. Unless mastitis treatments are employed in this way, little hope can be held for success in the eventual eradication of the disease from a herd.

In order to obtain the greatest benefit from intramammary infusions, early detection of infection and identification of the causative agent, by bacteriologic procedures, are of unquestionable importance.

ADMINISTRATION OF UDDER THERAPY

Regardless of the material injected into the udder, the quarter should be milked out thoroughly beforehand to avoid the immediate dilution of the therapeutic agent.

All equipment which comes in contact with the therapeutic agent or the teat canal must be sterile and free from foreign matter. The teat must be washed free of dirt and a suitable disinfectant applied to the external opening of the canal, immediately before the teat cannula is inserted. If several quarters are to be treated, a separate sterile cannula should be employed for each quarter.

CHEMOTHERAPEUTIC AGENTS

Neutral Acriflavine.—This is a coal-tar derivative. It is irritating for mammary tissue and may cause irreparable damage if solutions which are too concentrated are employed. This agent was first used on a large scale in dairies in Switzerland, while later investigations conducted in the United States resulted in certain modifications in dosage and administration. The usual procedure followed in this country is to dissolve the active principle in 700 cc. of sterile vehicle (20 per cent dextrose or 20 per cent sucrose, in water) to make a 1:1,500 dilution. A preliminary rinse of 200 cc. is infused and withdrawn. This is immediately followed by the injection of 500 cc. The principal infusion is left in the gland for periods varying from five to sixty minutes, depending on the concentration of neutral acriflavine and the nature of the vehicle employed. When indicated, treatment may be repeated in seven to fourteen days.

After the principal infusion has remained in the quarter for the optimum period, a complete milking-out of the solution must be attempted or an undesirable irritation may result. A hypertonic sugar solution favors complete withdrawal of the entire volume of the infused fluid—thus, it is possible to increase the concentration of the dye without danger of added irritation. In the treatment of a group of quarters representing every stage of infection with *Str. agalactiae*, little more than 50 per cent of cures* can be expected following one to three infusions given from seven to fourteen days apart. With lactating quarters, the milk is often yellow for several days and visible particles may occur for as long as ten days after an infusion has been given. Neutral acriflavine may be used on the dry gland, but it is advisable to avoid concentrated aqueous solutions, as it is sel-

*The interpretation of the term "cures," as used in this report, is given in paragraph 24 of the summary.

dom possible to withdraw any great quantity of the infused fluid after the elapsed time interval; excessive irritation may result from retention of a concentrated solution.

Neutral acriflavine has not shown any significant results in the treatment of *Staphylococcus aureus* infections of the udder.

Silver Oxide.—Five per cent silver oxide in mineral oil—so-called colloidal silver oxide—is described by the manufacturers as an extremely fine suspension of silver oxide in mineral oil. The small size of the silver particles — approximately one-eighth as large as a red blood corpuscle—is supposed to favor dispersion of the silver throughout the udder and to render it readily available for deep penetration of the tissues. That favorable therapeutic action is not necessarily dependent upon the minute size of the silver oxide particles is indicated by the fact that treatment has been equally successful with suspensions prepared by simply grinding silver oxide in a mortar and slowly adding sterile mineral oil in sufficient quantity to make a 5 per cent suspension of the silver oxide.

In the treatment of the lactating udder, 10 cc. of 5 per cent silver oxide in oil is injected per quarter on three successive days. This chemotherapeutic agent is the most irritating of all those now in use for the treatment of mastitis. Infused quarters become edematous, sensitive to the touch, and the secretion becomes thick, contains many clots and shreds, and assumes a gray color. The milk often remains visibly abnormal for five to ten days and production frequently decreases as much as 50 per cent, seldom returning completely to the pretreatment level for the remainder of the lactation. Infrequently, irritation is so severe that scar tissue forms in the teat canal and large ducts, with resultant partial to complete occlusion. The percentage of cures from *Str. agalactiae* infections in lactating quarters varies from 35 to 80 per cent. Because of its irritating properties, silver oxide in oil is not the therapeutic agent of choice for use on the lactating gland.

The effectiveness of silver oxide in the dry udder has received considerable study. A single injection is given and left in the gland. For the dry udder of average size, 10 cc. is employed, while with very small glands 5 cc. is adequate and advisable. With quarters showing swelling and containing a purulent exudate, the dose may be increased to 12, 15, or 20 cc., the volume given to be determined by the size of the quarter and the quantity of purulent exudate removed. Following treatment, some edema and soreness develop, but this is not objectionable and often recedes in a few days. In recent infections with *Str. agalactiae*, as high as 85 per cent cures have been obtained following a single injection, while in the treatment of more chronic infections, the level of cures ranges between 50 and 60 per cent. Data are available to indicate that treatment is most efficient when given early in the dry period. The injection of silver oxide into the dry gland is not without danger of producing tissue injury, for approximately 3 per cent of the treated quarters may be expected to become nonfunctional as a result of closure of the teat canal by overgrowth of scar tissue.

In spite of the irritating properties of silver oxide in mineral oil, application of it may be made, as a last resort, in the case of quarters harboring *Str. agalactiae* infections which have failed to respond to infusions of less irritating therapeutic agents. No data have been published which claim silver oxide in oil to be effective against *Sta. aureus* infections of the udder.

Phemerol.—Phemerol is a 1 : 1,000 aqueous solution of quarternary ammonium compound. In quarters shedding *Str. agalactiae*, with little or no induration, a dosage of 75 cc. per quarter, may cure up to 86 per cent of the affected quarters, whereas udders with marked indurative changes do not respond. A transitory thickening of the mucous lining of the teat and milk cisterns, associated with an abnormal secretion, is observed in most cases for varying periods after medication. The greatest reduction in milk flow, as a result of the infusion of phemerol into the udder, occurs in cows in the early stages of lactation. It is recommended, therefore, that use of this agent be limited to infected cows near the end of their lactation period.

Sulfanilamide.—The first studies with sulfanilamide in the treatment of mastitis were limited to the drug given by mouth. It was soon discovered that large quantities, administered over a period of several days, were required in order to obtain an appreciable clinical effect. The oral administra-

tion of sulfanilamide cannot be recommended as a routine method for removal of *Str. agalactiae* from the udder, but it has a definite place in the treatment of the associated clinical symptoms. An initial dose of 1.5 gr. per pound of body weight, followed by one half that dosage at intervals of twelve hours for several days may be given. However, this dosage of sulfanilamide may prove toxic for some cows. A developing toxicity is manifested by general sluggishness, loss of appetite, and drop in milk flow. When these symptoms develop, the administration of sulfanilamide should be discontinued.

Sulfanilamide given by mouth is rapidly eliminated by the kidneys, and only a fraction reaches the mammary glands. Therefore in order to obtain a high concentration within the udder, it is more logical to infuse it into the organ. For intramammary infusion, sulfanilamide is suspended in a light mineral oil, and the commercial products contain between 35.0 and 37.5 per cent. A dosage of 40 to 50 cc. per quarter is recommended to be given daily for four days. If the infection persists after one course of treatment, the injections should be repeated, using 80 cc. per quarter. Some investigators, on the other hand, claim that a higher dosage of from 100 to 120 cc. is preferable.

Sulfanilamide in oil is relatively nonirritating for mammary tissue; thus, it can be infused into lactating or dry glands without danger of lowering production or causing tissue injury. It is a valuable therapeutic agent for reducing clinical symptoms caused by either streptococcal or staphylococcal infections. The investigators responsible for its development and use have stated that over 90 per cent cures were obtained in *Str. agalactiae* infections, and that this agent was also effective in removing *Sta. aureus* from the udder. Reports by others reveal as low as 36 to 55 per cent cures from *Str. agalactiae* following four injections on successive days, and no decided advantage over any other therapeutic agent was found in the removal of staphylococci from infected quarters.

Sulfanilamide infusions, while not always effective in removing *Str. agalactiae* from the udder, do, however, produce a considerable reduction in the number of organisms shed in the milk for a variable period following treatment. A residual infection may be overlooked if searching, bacteriologic methods are not employed in determining results of treatment. Differences in bacteriologic methods used by the various investigators may explain, in part, the wide divergence in percentage of cures claimed.

U. S. B. and Reazol Solutions.—U. S. B. solution consists of urea 8.8 per cent, sulfanilamide 8.8 per cent, and benzyl alcohol 3.0 per cent, in an aqueous base composed essentially of propylene glycol.

Reazol: Same formula as for the U. S. B. solution, except the sulfonamide content consists of 4.4 per cent of sulfanilamide and 4.4 per cent of sulfathiazole.

These preparations are not too irritating in the udder. Following treatment, the milk may be abnormal in appearance for a period of from two to five days. It would seem that in the treatment of chronic streptococcal mastitis, these agents have about the same efficiency as sulfanilamide in oil. Usually, the dosage for a single treatment is 25 cc., and for repeated treatments in which the drug is administered on three successive days, the dosage is 18, 10, and 5 cc., respectively.

Iodine.—Iodine incorporated in mineral oil has been suggested for the treatment of mastitis by intramammary infusion during the dry period. A concentration of 1 : 1,250 of iodine in 500 cc. of oil is injected into dry quarters and allowed to remain throughout the dry period. In advanced cases of infection, the quarter should be stripped out in ten to fifteen days and the treatment repeated. It also has been advocated that a combination of iodine (1: 2,000) and sulfanilamide (28.3 per cent) be used for intramammary infusions. Three or four injections of 50 to 75 cc. each per quarter are to be given at daily intervals. This treatment may be used on lactating, as well as dry, quarters. Since reports on the efficacy of these agents in the treatment of mastitis are limited, it is not possible to evaluate them.

ANTIBIOTIC AGENTS

Tyrothricin and Gramicidin.—These are antibiotic agents obtained through the growth of the common soil microörganisms, *Bacillus brevis*, in special culture mediums. Extracts of such cultures are called tyrothricin, and from it, two crystalline products, tyrocidin and gramicidin, can be separated. Tyrocidin is so toxic that it has

not been used commercially. The purified product, gramicidin, has a higher bactericidal action against *Str. agalactiae* than tyrothricin. However, up to the present, the cost of production has restricted the use of gramicidin to experimental studies, whereas commercial preparations of tyrothricin have been extensively used in the field for the treatment of bovine mastitis. Tyrothricin appears on the market under several trade names, in either aqueous or oil vehicles. The dosage is determined on the basis of milligrams of tyrothricin per cubic centimeter of vehicle. Some of the commercial products contain 2 mg. per cubic centimeter, while others have only 1.0 or 1.5 mg. per cubic centimeter.

For best results, the dosage of tyrothricin should be adjusted to the size and activity of the quarter to be treated, *i.e.* 80 mg. for small quarters, 120 mg. for medium-sized quarters, and 160 mg. for large quarters. Various investigators have reported between 45 and 95 per cent cures in lactating quarters from *Str. agalactiae* infections, following infusions with tyrothricin. The marked difference in percentage of cures obtained by various workers can be attributed in part to differences in dosage, severity of cases selected for treatment, and bacteriologic techniques employed for determining results of treatment.

Tyrothricin is moderately irritating for mammary tissue; therefore, a variable degree of swelling and abnormal condition of the secretion results from infusion of lactating quarters. Severe tissue injury may result from an overdose; thus, care should be taken in determining the volume to be employed for each quarter.

The use of gramicidin or tyrothricin in dry udders has not been extensively reported in the literature. However, results that have been published indicate that more cures are obtained in dry, than in lactating, quarters. Tyrothricin has an advantage over silver oxide for dry cow treatment in that it is less irritating—thus, permanent tissue injury is not apt to occur. For the average-sized dry gland, 80 mg. is adequate, while with very small quarters less should be infused.

Penicillin.—This antibiotic agent is produced by the mold, *Penicillium notatum*, and, like tyrothricin, it is effective principally against the gram-positive pathogens. It was discovered as early as 1929; and although it was not isolated in purified form at that time, its usefulness in the treatment of local infections caused by penicillin-sensitive bacteria was demonstrated. In 1939, when the antibiotic agents, tyrothricin and gramicidin, were isolated, this stimulated interest in the entire field of antibiotic agents, and penicillin again received attention. Investigators at Oxford University devised methods for obtaining it in purified form and in sufficient quantities for trials on infections in man. This pioneer work demonstrated that purified penicillin is a powerful antibacterial agent of low toxicity. The Armed Forces of the United Nations became interested in penicillin for use in controlling infections in war wounds, and, under this stimulus, large-scale commercial production was undertaken in the United States.

In 1945, penicillin was released for use in veterinary medicine; immediately, intensive research on its possible application in the treatment of bovine mastitis was started. It is marketed as the sodium or calcium salt of penicillin; either form is satisfactory for use in the treatment of mastitis. The dosage is measured in Oxford units, and the standard vial contains 100,000 units in the form of a dry powder. In the dehydrated form, penicillin will maintain its potency for many months if kept at a temperature of 50 F., or lower. For udder infusions, the penicillin is dissolved in a sterile, fluid vehicle such as distilled water or physiological saline solution. Penicillin in solution loses its ability to destroy bacteria in a few days, even when stored in the refrigerator. For this reason, it should not be dissolved in the vehicle until immediately before use, and any portions of the solution which must be held over for later injection must be kept below 50 F. and used within sixty hours.

Suspensions of penicillin in mineral oil have been prepared and used experimentally. They are more stable than water solutions and may be stored in the refrigerator for several weeks without an appreciable loss in potency. Oil suspensions, however, must be heated to body temperature and must be shaken before use.

With water or saline solutions, the possibility of irritation from the vehicle is reduced if the volume does not exceed 50 cc., and even smaller quantities than this may prove effective. In the treatment of dry glands, a 50-cc. volume may be more suit-

able than smaller amounts, for it enhances the distribution of the penicillin throughout the cistern area. Some workers are of the opinion that mineral oil suspensions of penicillin may be less irritating than water solutions and more effective when the volume injected is increased to 100 cc.

Penicillin-sensitive bacteria are not immediately destroyed by contact with this agent, but several hours exposure is required. In the treatment of mastitis, an adequate concentration of penicillin must be maintained within the infected quarter for a sufficient period of time to result in complete destruction of the infecting organisms. Milk does not inhibit the bactericidal action of penicillin against *Str. agalactiae* other than to reduce its efficiency when too great a dilution occurs in a heavily producing udder.

There is a wide variation in the dosage of penicillin used by different workers, and the results reported are based on too few animals to permit, at this time, specific recommendations for use of the drug under average field conditions. However, available information indicates that the amount of penicillin required to eliminate *Str. agalactiae* from the udder varies over a wide range, depending upon the stage of infection, size of the udder, and volume of milk produced. In early or mild infections, quarters receiving as little as 1,000 units have responded to treatment; whereas, in chronic cases with large udders, the use of 100,000 or more units may be required to accomplish cures in a reasonable percentage of cases.

On the basis of present knowledge, it appears that under average herd conditions the infusion of from 25,000 to 50,000 units of penicillin in water per infected quarter, once a day for four consecutive days, is adequate to produce a cure in the majority of cases of *Str. agalactiae* infections. If a one-injection treatment is used, it appears that 100,000 units in 100 cc. of vehicle (oil or water) may eliminate *Str. agalactiae* from about 75 per cent of the quarters treated. In order to prolong the presence of penicillin in the udder, it may be desirable to skip one milking when a single injection is used. There are no contraindications other than that, in cases of mastitis caused by bacteria not sensitive to penicillin, little benefit will result from its use.

Penicillin shows greater promise of effectiveness against *Sta. aureus* infections of the udder than any of the other therapeutic agents now in use. However, the staphylococci are much more resistant to penicillin than the streptococci and, therefore, the dose levels effective against *Str. agalactiae* are not so efficacious against *Sta. aureus*. It is anticipated, however, that studies now in progress will reveal procedures for use of penicillin which will give maximum results against staphylococcal udder infections.

SUMMARY

1) *Is bovine mastitis a problem of the individual cow or of the herd?* It is a problem of the herd. A survey should be made in each herd to determine the incidence of infectious mastitis, and the extent to which environmental conditions and management practices are contributing to the spread of infection, and to the occurrence of noninfectious mastitis.

2) *Where udder medication is contemplated, is it essential that a strict mastitis-control program be adopted for the management of the herd?* Yes. Barring injuries, when infectious mastitis is prevalent in a herd, it simply indicates that management, supervision, and sanitation have been lax. Thus, the herd operations should be so adjusted as to control or prevent the spread of the infection. After quarter samples of milk from the entire herd have been bacteriologically tested, the cows should be grouped in the stable according to the results of the laboratory tests of the milk and physical examinations of the udders. Cows with normal udders that are free from infection should head the milking line, with mild or early cases of the disease to follow, while advanced, chronic cases should be segregated in another barn or at the end of the milking line, away from the noninfected individuals. Starting with the normal animals, the cows should be milked in the order of their standing in the barn and any new additions should be free from infection. It is most essential that strict sanitary measures, as recommended by the veterinarian, be adopted and that the entire herd be retested at intervals of from thirty to ninety days until it is completely free from *Str. agalactiae* infection.

3) *Is it necessary to examine, bacteriologically, the secretion from obviously affected quarters before the treatment is begun?* Yes. Although, following treatment, the character of the milk may be temporarily improved, it is a waste of labor and money to treat cases of mastitis solely on clinical changes occurring in the udder and on visible changes in the appearance of the milk, for some of these udders are not infected. The gland may be atrophied or contain scar tissue (hard lumps), and the secretion may be abnormal in appearance as the

result of a previous infection, injury, sickness other than mastitis, hormonal disturbance such as may occur preceding abortion, or changes which occur in the udder during early and late lactation.

4) *What cultural tests are of practical use for the diagnosis of mastitis?* A combination of the Hotis test and the microscopic examination of incubated milk films provides a most useful and searching test for field use. With very little equipment, it is possible for the veterinarian to render a worthwhile diagnostic service to the dairyman in eradicating mastitis if these tests are applied to the milk from separate quarters of individual cows. However, where possible, it is recommended that a laboratory service, supported by the state, be provided.

5) *During or after treatment is it necessary to apply bacteriologic tests to the milk to determine whether a cure has resulted?* Yes. The freedom from flakes and improvement in the macroscopic appearance of the milk is no assurance that the quarter has been freed of its infection. There may be a temporary improvement without complete elimination of infection. If the infection is allowed to persist, further destruction of the secretory tissue will occur.

6) *Is treatment more effective in lactating udders than in dry udders?* No. Experience has shown that the best results are obtained from intramammary infusions administered in late lactation or during the dry period. This is true because the infected tissues are concentrated, due to shrinkage of the gland; little or no dilution of the active agent occurs as a result of secretory activity, and, since milking at regular intervals is not required, the active agent can be left in the udder for a longer period of time. When treatment must be given to lactating udders, it should be realized that repeated injections may be required to produce a high percentage of cures. With the more irritating therapeutic agents, a reduction of milk flow often follows treatment. When a single infusion is made, this usually is temporary, but with repeated injections during lactation, production seldom returns to pretreatment level for the remainder of that lactation.

7) *Are repeated treatments indicated in lactating udders?* If cows in full milk yield do not respond to a reasonable number of treatments, further medication should be discontinued until they are dry. Repeated treatments may excite the irritation already existing in the quarter, resulting in an acute attack of mastitis.

8) *Is it important to select the cases of mastitis for udder medication?* Yes. Newly or lightly infected udders respond much more readily to udder therapy than advanced, chronic cases, where much of the secretory tissue has been replaced by scar tissue (induration-fibrosis). Treatment is expensive, hence infected cows with badly damaged udders or cows which are poor producers should be sold for slaughter.

9) *In udder therapy, is water a more desirable vehicle than oil?* No. A water solution is easier to handle in the field, especially when neutral acriflavine and penicillin are employed. An oil preparation, on the other hand, has certain advantages in that (*a*) the oil may be less irritating than sterile water or physiological saline; (*b*) it may be soothing to the irritated tissues; (*c*) following a single injection, the oil may be retained in the cistern for several days and thus retard the growth of the streptococci; and (*d*) the therapeutic agent injected may be released more slowly and thus prolong its curative action. A disadvantage of an oil preparation, however, is that it is more difficult to inject and, unless the equipment is thoroughly cleaned immediately after use, any rubber attachments deteriorate rapidly. It is recommended that with oil preparations of the sulfonamides and penicillin, a syringe with a rubber plunger be used. Other agents suspended in oil, which do not settle out, can be injected with an all-glass syringe.

10) *Is there an individual variation in the response of the udder to the introduction of chemotherapeutic agents?* Yes. No one can predict how the udder will react to the administration of a chemotherapeutic agent. Some cows, with mild or chronic infections, may react severely and develop acute symptoms, whereas other cows with similar infections may show little, if any, reaction. Agents like sulfanilamide and penicillin, which usually are nonirritating to the udder, may cause a severe reaction in the udders of some cows.

11) *Should treatment be applied to quarters which yield milk that is bacteriologically positive but normal in appearance?* Yes. If treatment is delayed until clinical symptoms appear, extensive damage to the milk-secreting tissue may result; the chances for eliminating the infection are reduced, and the animal concerned serves as a source of infection to other cows, even though her milk appears to be normal.

12) *Is it advisable, in the absence of infection, to treat quarters in which the secretion appears normal but has a high cell count and alkalinity (positive brom-thymol blue reaction)?* No. The change in the pH reaction (positive brom-thymol blue test) of the milk may not be associated with infection. The quarter may have been injured or irritated and nature (leucocytosis) is simply attempting to repair the damage. The introduction of a therapeutic agent at this time may bring on an acute attack of mastitis, often resulting in a blind quarter.

These cases should be regarded as suspicious until it is shown definitely by repeated cultural tests that they are free from infection.

13) *Is it advisable to treat udders with injured teats?* Yes. When the teat is injured, daily injections of penicillin, sulfanilamide in oil, or tyrothricin may prevent infection while the wound is healing.

14) *Is udder therapy indicated in acute cases of mastitis?* This is a debatable question. In acute mastitis, the secretory tissue is severely involved so that any material injected into the udder should be nonirritating; otherwise, udder therapy may result in complete destruction of the glandular tissue. Moreover, when the udder is severely congested and the secretion is scant, it is obviously impossible for any agent injected into the milk cistern to reach more than a very small portion of the quarter. Repeated injections of a nonirritating agent, if combined with other measures to reduce the congestion, may be helpful in some cases. Usually, when acute cases of gangrenous mastitis, often referred to as "blue bag," are detected, the infection has progressed so far as to destroy much of the secretory tissue so that, if the animal recovers, the affected quarters may no longer function properly. Nursing and symptomatic treatment as prescribed by the veterinarian may be most beneficial.

15) *Should cows with mastitis be rested during treatment?* Yes. If lactating cows are segregated from the milking line and maintained on a low production diet in order to rest the udder, they seem to respond more favorably to udder medication.

16) *Should special precaution be taken in the milking of cows while under treatment?* Yes. It is desirable to hand-milk these cows so that the dairyman can more closely observe unfavorable changes in the udder and secretion.

17) *How long after udder medication should the milk be discarded?* In all instances, the secretion obtained at the first milking following treatment should be discarded, and in subsequent milkings as long as the foremilk is abnormal in appearance.

18) *Are some of the therapeutic agents more suitable than others for the treatment of lactating or dry udders?* Yes. In lactating udders, penicillin is the least irritating but usually repeated treatments are required. Various preparations of tyrothricin, although more irritating, are not objectionable. Apparently, some agents which are irritating in lactating udders usually produce little, if any, reaction in the dry udder.

19) *Are the various therapeutic agents now available for udder medication more effective in curing mastitis caused by Streptococcus agalactiae than infections caused by other microörganisms?* Yes. Apparently, more cases of mastitis caused by *Str. agalactiae* respond to treatment than mastitis infections attributed to other kinds of streptococci, staphylococci, and coliform organisms.

20) *With the use of improper instruments and the careless administration of udder therapy, is it possible to convey bacteria into the udder and reinfect the gland with foreign organisms?* Yes. Agents used in udder therapy are selective in their action. While they are highly effective against certain pathogenic bacteria, they have little or no ability to destroy others. An outbreak of udder tuberculosis has been reported which was attributed to the irrigation of a number of quarters on the same day, with the same apparatus. If it is possible to convey tubercle bacilli to the udder through the medium of udder irrigation, it seems quite probable that other bacteria such as coliform organisms, *Brucella abortus*, etc., might be transmitted in the same manner.

21) *Should udder medication be administered only by a veterinary practitioner?* Yes. He can determine by a thorough physical examination of the udder and its secretion whether the cow is suitable for treatment. Extreme care should be exercised in the preparation of the teat and the instruments to avoid contamination, injury, and the possibility of conveying miscellaneous bacteria into the gland. Moreover, any fluid injected into the udder should be at body temperature. Thus, in cold weather, improperly tempered solutions can be irritating. The infusion of therapeutic agents into the udder should be done only by persons who have been trained in the preparation and handling of sterilized materials and who have an understanding of the physiology of the udder and of the nature and limitations of the product chosen for injection.

22) *Should the udder be massaged after each injection?* Yes. Regardless of the quantity of material administered, the lower portion of the quarter should be thoroughly massaged following each injection to facilitate distribution.

23) *In the average dairy herd, what percentage of cures can be anticipated with the various agents now available for udder medication?* The efficiency of any kind of udder therapy with bactericidal agents depends upon (*a*) a proper diagnosis, (*b*) care used in administering treatment, and (*c*) proper herd management. The percentage of cures will be much higher in herds under a strict mastitis-control program (including laboratory examination of milk samples) where the advanced clinical cases of the disease have been gradually eliminated, for most of the animals presented for treatment will have mild or early infections which respond more readily to udder therapy. With some

agents, 90 per cent of the affected animals may be freed of their infection. On the other hand, in the average dairy herd, the number of cures may be much lower, possibly around 60 per cent or less. The main reason for this lower efficiency in the average dairy herd is that little attention is being given to the actual control of the disease, or to the diagnosis of the infections. Moreover, even though the treatment may be 90 per cent effective, it is essential that the hopelessly incurable cows be removed immediately from the herd before the successfully treated animals become reinfected. It should be borne in mind that quarters which have been cured are not immune to mastitis but remain susceptible to reinfection.

24) *What constitutes a cure in mastitis?* The complete elimination of the disease-producing bacteria and the ability of the treated quarter or quarters to resume the secretion of normal milk. Bacteriologic tests conducted over a period of two or three months must be negative for the organism in question, before a quarter can be designated as cured. Nothing else will suffice.

25) *Is treatment the answer to the bovine mastitis problem?* No. With udders suitable for medication, in which a diagnosis of the infection has been made, proper medication can be expected to salvage many cases of chronic mastitis and thus prolong the usefulness of cows previously regarded as hopeless. With regret, it is necessary to point out that, up to the present, treatment cannot be regarded as the answer to the problem of mastitis, for the real answer is still, now as before, *prevention of infection.*

The Texas Longhorn and His Successors

During the last fifty years, when the human population of the United States has increased to approximately 140,000,000, along with a prodigious growth of the livestock population, the aboriginal Longhorn has been largely replaced by the white-faced Hereford through the eradication of the cattle tick—an accomplishment that stands without counterpart in American agricultural history, and certainly without parallel as an achievement of veterinary research by the U.S. Bureau of Animal Industry. The two Longhorns were raised (obviously as souvenirs) by McNeil and Graves, of Brazoria, Texas.

Rennet Extract

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THE DISCOVERY of cheese[1] has often been attributed to an ancient Arabian traveler who carried milk in a canteen made from a dried sheep's stomach. He started on his journey in the cool darkness before dawn, plodding on and on through the furious heat of midday. As the journey was long and hazardous, he hastened through the mountain passes, not pausing for his noonday meal of dried dates and goat's milk. After nightfall he stopped, overcome with thirst and weariness, and he lifted his canteen to his lips. To his astonishment and alarm, no cooling draught of goat's milk came forth—only a thin watery liquid. Curious as to what had become of the original contents of his canteen, the traveler cut open the skin and there, in place of milk, he found a curious mass of white curd—the world's first cheese.

It was years later before the cause of this phenomenon was discovered. Two digestive enzymes are found in the stomach which act upon milk. Rennin coagulates the casein of milk, forming a curd, and pepsin digests the curd. Rennet extract contains both rennin and pepsin. In the cheese industry, rennet extract is very important. It is used daily to coagulate the casein of milk and form the curd which we eventually call cheese. The extract is manufactured or obtained from the calf stomach.

The bovine species has a stomach made up of four compartments: the rumen or paunch; reticulum or honeycomb; omasum, manifold, or manyplies; and the abomasum or rennet. The abomasum, or fourth compartment, is used in making rennet extract.

Among the structures of the abomasum which Sisson[2] has pointed out, the most important in the production of rennet extract is the mucous membrane. The three glandular regions—cardiac, fundus, and pyloric are highly important in the secretion of the gastric juice which contains rennin and pepsin. The abomasum, therefore, is the glandular portion of the ruminant stomach, and it presents chiefly the fundus and pyloric zones, with their respective kinds of glands. Their secretion is the gastric juice, and the function of the abomasum is essentially the same as the function of the simple stomach. Dukes[3] describes the gastric glands and the gastric juice of the simple stomach.

The discussion now deals with the actual production of the rennet extract. Most rennet extract manufacturers obtain calf stomachs, or rennets, from packing plants. The best rennets[4] are from newly killed, young milk-fed calves, any age, 1 day old and up, as long as the animal is living on milk. Rennets containing mixed feed when slaughtered are acceptable, but dirty, thick, rennets from old calves fed on grass are of no value. Grade 1 rennets are produced only from calves which have been fed chiefly on milk, and they must be properly salted and trimmed. The finest rennets contain nothing but milk curd at the time of slaughtering. Grade 2 rennets are produced from calves which have been fed on both milk and mixed feed when slaughtered. A shipment of milk-fed rennets to which a number of grass-fed rennets have been added might also be grade 2. This grade is accepted at a lower price than is paid for grade 1. Grade 3 rennets are produced from calves which have been fed on milk, mixed feed, and grass.

At the packing plant, the calves are killed and the viscera are inspected by veterinarians of the Meat Inspection Division of the United States Department of Agriculture. After inspection, the viscera are separated by a worker, and the stomach and intestines are thrown down a chute to another floor. Here a worker stands at a table (fig. 2) which has a vertical board with a hook. He removes the abomasum from the rumen and reticulum, leaving part of the omasum on the abomasum. The small or duodenal end of the abomasum then is placed on the hook; all of the fat is trimmed off, and the abomasum is slit the entire length. The contents of the abomasum are removed, but the inside is never washed. All of

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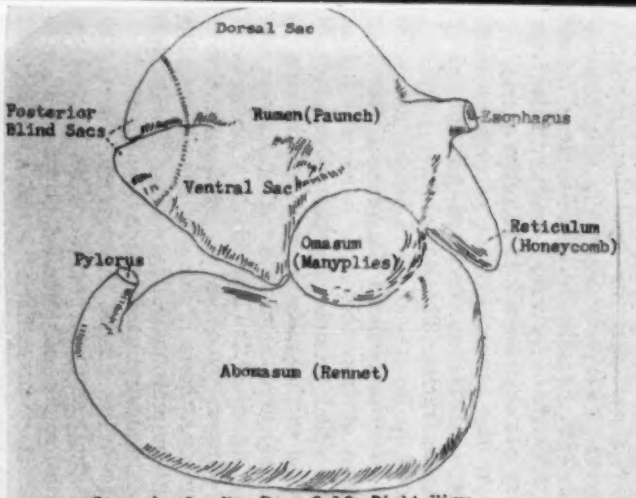
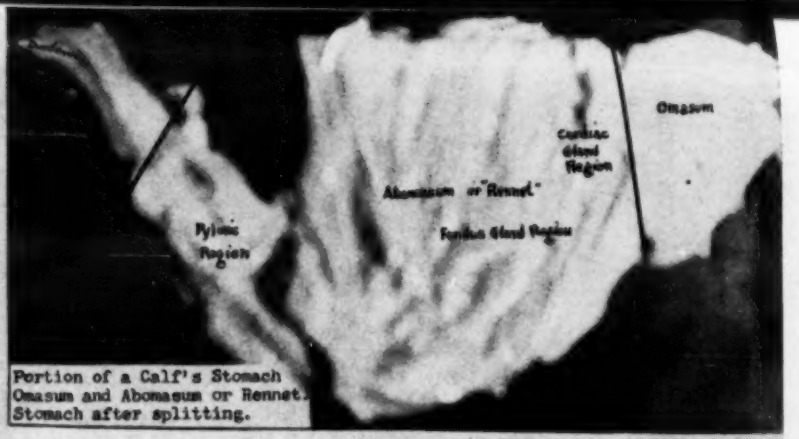
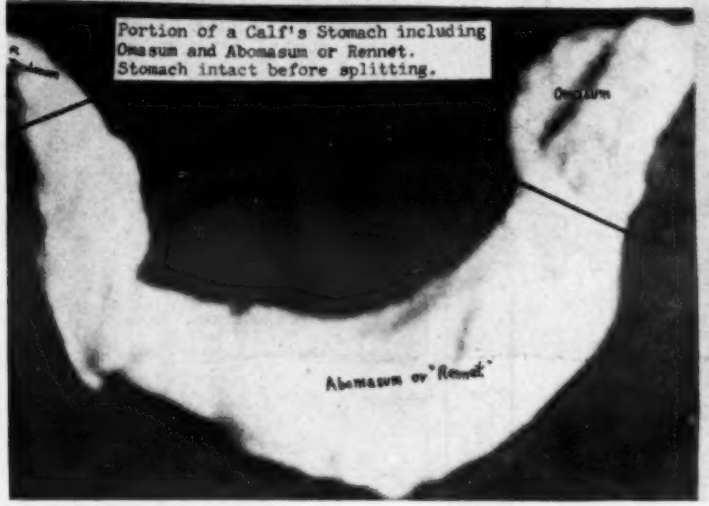
The author is at present the post veterinarian at Fort Sheridan, Ill. The interest in cheese and the products to make cheese was developed during a sanitary survey of the cheese factories of Wisconsin.

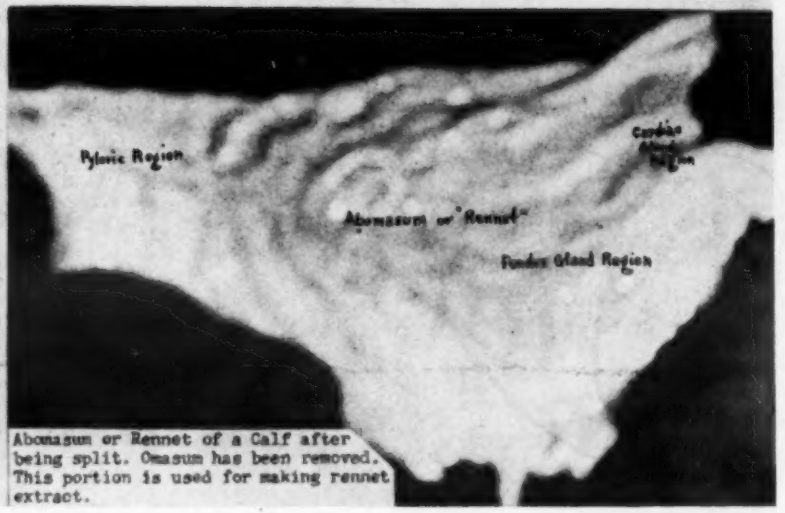


Stomach of a New-Born Calf; Right View. The Rumen is raised.(The Anatomy of the Domestic Animals - Sisson. 462)



Portion of a Calf's Stomach Omasum and Abomasum or Rennet. Stomach after splitting.





Abomasum or Rennet of a Calf after being split. Omasum has been removed. This portion is used for making rennet extract.

Fig. 1—The anatomy of the stomach of a calf.

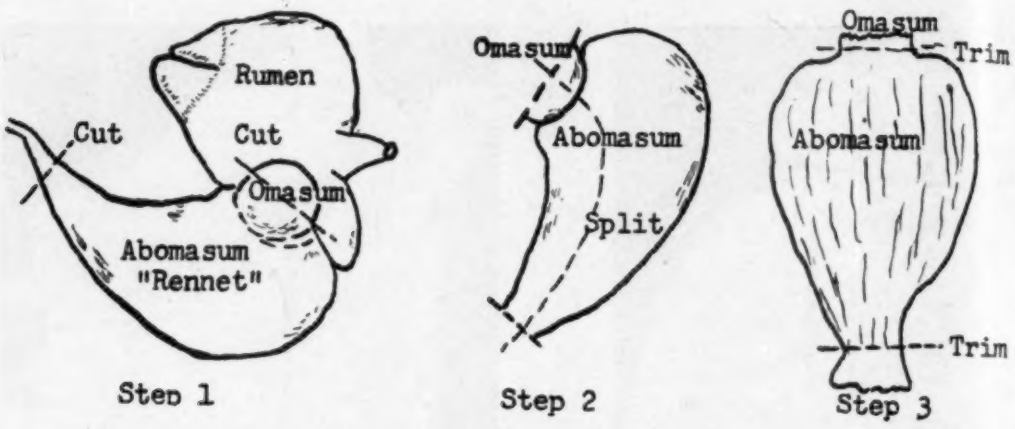


Figure 1a

Step 1—Cut off the abomasum from the rumen and reticulum, leaving part of the omasum attached to the abomasum. Also cut the duodenal end of the abomasum.
Step 2—Place the duodenal end or small end of the abomasum on a hook. Trim off all fat and slit the abomasum the entire length.
Step 3—Trim off all of the thick omasum at the large end of the abomasum, being careful not to remove any of the large end of the abomasum. This is the most valuable part and should be saved.

the omasum is removed, care being taken not to remove any of the large end of the abomasum proper, as this is the most valuable part. Then the long, narrow end of the abomasum is trimmed.

The rennets, now properly trimmed, are ready for salting. This should be done as soon as possible after the calf is killed; otherwise the rennets will lose strength and may spoil. When spoiled rennets are salted, they may turn pink and have a strong odor. The salting is usually done in a salt box near the trimming place. The rennets should be stretched out as flat as possible, and the salt rubbed well into them, particularly under the folds. They are usually salted heavily and then packed in tierces. After a day or so, they are removed from the tierces and counted into barrels, about 600 to a barrel. The salting treatment shrinks the fiber and makes the rennet white and fairly dry to handle. The salted rennets should be kept in a cool, dark place until ready for shipment, but they should not be held longer than a month. The packers usually ship the rennets in barrels to the various rennet extract manufacturers, and in this form, they are sold for about 18 cents each.

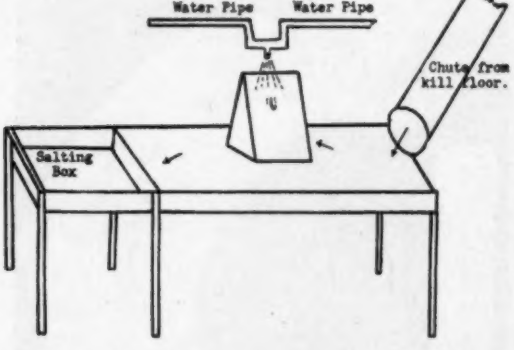


Fig. 2—Table where the rennets are removed from the other compartments of the stomach and salted. After salting they are placed in tierces.

At the rennet extract processing plant, the rennets are received and placed on wooden racks. These racks are piled on a truck in layers, and the trucks are rolled into an oven, where the rennets are dried. After drying, they are hard and brittle. The dried rennets are then shredded and mixed with excelsior, and this mixture is placed in wooden vats. A salt brine containing some boric acid as a preservative is sprayed over the top of the mixture in the vats. This is done by the use of pipes with numerous ventral holes. These pipes rotate around a central axis above the vats. The brine filters through to the bottom of the vat and then flows to another vat at a lower level. The fluid from the second vat is pumped back to the spraying unit over the first vat and the fluid is allowed to filter through a second time. This pro-

cedure is continued until the strength of the fluid going into the first vat is the same as the strength of the fluid coming out. The fluid obtained is filtered clear by using a filter press, and then is stored in a cool, dark place. After sufficient aging, it is tested and brought to a definite strength for sale to the cheesemaker. Rennet extract is commonly packed in 1-qt. and 1-gal. bottles, or 5-, 10- and 24-gal. kegs.

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Caponizing

The potential capon crop runs into about half as many millions as there are chicks hatched and which survive the brooder age, but the total annual number of castrates is but a small proportion of these. The number caponized by veterinarians is insignificant. Most of the caponizing is done by technicians of one sort or another. It was once believed that one ought to be able to arrange a set-up in which speed would overcome the small price of the operation per bird. The predieted cockerels caged for easy access, helpers who confine them, pluck the site and push them forward to the comfortably seated operator who passes them along to be released and gently reconfined by another helper, all in true "production line" fashion ought to settle the matter of economics, experts have assured us. A hundred birds in an hour would be attractive at ten cents per bird, an Iowa practitioner once said, and a softer chore than a case of dystocia or retained afterbirth. Up here in a skyscraper overlooking Lake Michigan may not be the best place to give advice on the technique of farm surgery but having done some caponizing with more or less satisfaction, the above directions seem to be apropos if for no other purpose than to serve as a reminder that caponizing *is* a surgical operation and the season for thinking about it is arriving. Perhaps, more interest in the capon by veterinarians might in time increase the annual crop.

Highlights from the Sixty-Fourth Annual Meeting, Illinois State Veterinary Medical Association Jan. 17-18, 1946

How soon will this cow again become pregnant? This is the question of paramount importance in the treatment of all reproductive disturbances — *Dr. J. C. Schwab.*

The glanders situation in China today is very much like that which prevailed in the United States during the Civil War.—*Dr. E. E. Slatter.*

The control of brucellosis is an individual herd problem, and complete reliance must be placed upon the practicing veterinarian to provide a prompt and adequate service in order to achieve control.—*Committee on Brucellosis.*

Fits and nervous disorders in dogs may be avoided with a diet of meat supplemented with vitamin A.—*Dr. S. W. Haigler.*

Mixed bacterial infections can be treated with 5 per cent neoprontosil solution at the rate of 1 gr. to 10 lb. of body weight. Pain from this injection can be largely eliminated by diluting this solution with an equal volume of distilled water. — *Dr. R. E. Ruggles.*

In making a diagnosis in dogs, it is important to differentiate between the virus of Carré and bacterial infections.—*Dr. L. J. Lacroix.*

Proper dosages of sulfaguanadine, sulfathalidine, and sulfasuxidine yield equally successful results in calves.—*Committee on Scours and Pneumonia in Calves.*

Animals that are well nourished possess ten times as much antibody (*gamma globulin*) as those fed on a protein deficient ration.—*Committee on Nutrition.*

The feeding of colostrum for seven days was just as effective in controlling calf diseases as was the feeding of colostrum for three days followed by vitamin capsules for twenty days.—*Dr. W. E. Krauss.*

Studies on Bovine Mastitis
III. Penicillin Therapy in Streptococcic Mastitis

HARRY J. HARDENBROOK, D.V.M., M.S., J. O. ALBERTS, M.S., V.M.D., and H. S. BRYAN, D.V.M.

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SINCE THE DISCOVERY of penicillin by Fleming,[1] numerous critical tests *in vitro* and *in vivo* have proved its antimicrobial potency against pathogenic streptococci. The relatively nontoxic properties of therapeutic doses have likewise been established. In addition to its proved antibacterial activity in human streptococcic infections,[2, 3, 4] Kakavas,[5] Bryan,[6] Murphy and Pfau,[7] and Slanetz and Allen[8] have presented evidence in support of the curative value of penicillin in the treatment of *Streptococcus agalactiae* infections of the bovine udder. The advantages of an efficient, nontoxic, nonirritating economical therapeutic agent for the treatment of bovine streptococcic mastitis prompted preliminary observations on the value of penicillin in the treatment of streptococcic infected udders as reported herein.

Penicillin administrations.—The penicillin solution employed was prepared from 100,000 Oxford unit vials of purified sodium salt. In the initial treatment, 100,000 units were dissolved in 40 cc. of 0.9 per cent sterile saline solution which provided 25,000 units per 10 cc. In subsequent treatments, 100,000 units were dissolved in 80 cc. of sterile saline solution or 25,000 units per 20 cc. One cow received 50,000 units in each infected quarter, and all other cows received 25,000 units.

Penicillin solution was infused into the udder immediately after regular milking periods, using teat tubes and a glass syringe, after which diffusion into deeper parenchymatous areas was assisted by a short period of massage. A change in the milking routine for treated cows was unnecessary. Retreatments were at 12- and 14-day intervals.

TABLE I—Udder Infusion of Sodium Penicillin for Chronic Streptococcic Mastitis

Cow	Month of Lactation	No. of Lactation	Clinical Status of Udder	Infected Quarters Treated	Doses	Units per Quarter per Dose	Quarters Cured and Treatments 1st	2nd	3rd	Quarters Not Cured
892	3	2	N.	1, 2, 3, 4	1	25,000	1, 2, 3, 4	...	...	.....
948	10	1	N.	1, 2	2	25,000	1, 2	...	...	1, 2
940	16	1	N.	1, 2, 3, 4	2	25,000	1, 2	3, 4	...	.....
902	6	2	N.	1	1	25,000	1	...	...	.....
875	6	2	N.	3	1	25,000	3	...	...	.....
962	6	1	N.	2, 3, 4	1	25,000	2, 3, 4	...	...	.....
756	1	5	Pend (Hp) 1, 2, 3, 4 S. fib.	1, 4	2	25,000	1	4	...	.....
751	16	4	Pend (Hp) 1, 2, 3, 4 S. fib.	1, 2, 3	2	25,000	1	2, 3	...	.....
838	7	3	Pend (Hp) 1, 2, 3, 4 S. fib.	2, 3	1	25,000	2, 3	...	...	.....
897	1	2	1, 4 Hp.-2 Sa-3 A.	2	1	25,000	2	...	...	.....
909	9	2	2, 3, S. fib.	2, 3	1	25,000	2, 3	...	...	.....
906	15	2	1, 2, 4 S. fib. 3 A.	2	2	25,000	.....	2	...	.....
796	13	4	1, 2 Sa.-3 S. fib.-4 M. fib.	1, 2, 3, 4	2	25,000	1, 3, 4	2	...	.....
798	5	4	1, 2, 4 S. fib.-3 M. fib.	1, 2, 3, 4	3	25,000	1, 4	...	2	3
770	17	4	1, 2, 4 S. fib.-3 A (pend)	2, 3	3	25,000	.....	...	2, 3	.....
699	12	5	1 S. fib.-2, 3, 4 M. fib.	1, 2, 3	1	25,000	1, 2, 3	...	...	.....
752	12	4	1, 3, 4 N.-2 M. fib. +A	1, 2, 4	3	25,000	.....	...	...	1, 2, 4
758	5	4	1, 3, 4 Pend. 2 Dif. fib.	2, 4	2	50,000	4	...	...	2

N=Normal udder; Hp=Physiological edema; Pend=Pendulous udder; Sa=Slight atrophy; A=Complete atrophy; S. fib=Slight fibrosis; M. fib=Marked fibrosis; Dif. fib=Diffuse fibrosis.
1=RF quarter; 2=RH quarter; 3=LH quarter; 4=LF quarter.

From the Department of Veterinary Pathology and Hygiene, University of Illinois, Urbana.

RESULTS AND DISCUSSION

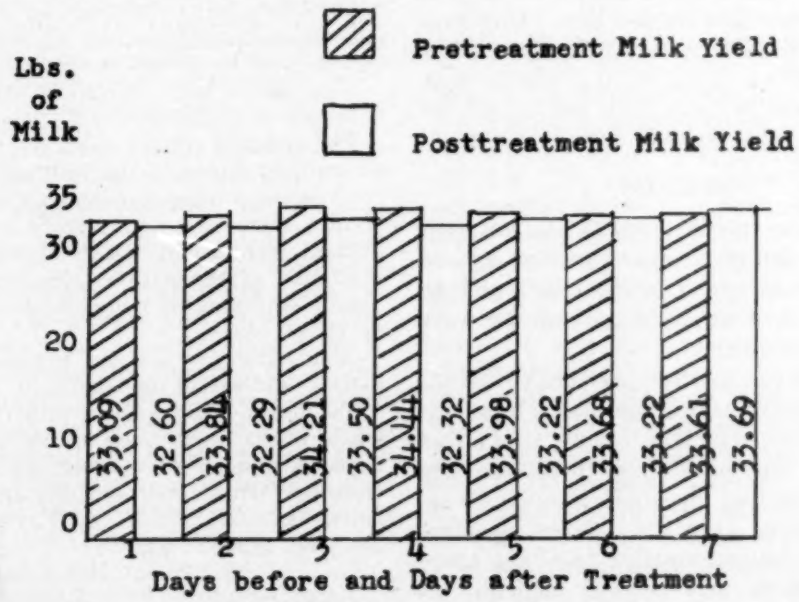
The results of the treatment of 44 *Str. agalactiae* positive quarters of 18 cows are shown in table 1. Identification of the organism was made according to the method described by Plastridge, Anderson, and Weirether.[9]

The udders of 6 cows with 15 positive quarters were free from detectable indurative changes, when palpated immediately after milking. Eleven quarters became free from infection after one treatment. Two quarters required two infusions and two quarters remained infected after three treatments. Milk samples collected at two days, one week, two weeks, and four weeks were examined microscopically and plated out on Edwards' mediums. The results of these laboratory procedures were used to determine the therapeutic efficiency of sodium penicillin.

The udders of 9 cows with 22 positive quarters showed changes due to injury or infection, or both, which varied from slight fibrosis and/or slight atrophy to marked indurative changes and/or marked atrophy. Twelve quarters responded to one treatment; two quarters became free of infection after two treatments; three quarters became negative after three treatments, and five quarters remained infected bacteriologically or microscopically.

Of 16 positive quarters in which slight fibrosis was detectable, ten became free of infection after one treatment, four after two treatments, and two after three treatments, while of two positive quarters with marked fibrosis, one became negative after one treatment, and one remained positive after the third treatment. One atrophied quarter with marked fibrosis was positive after three treatments. Of three quarters which had undergone partial atrophy, two

TABLE 2—Daily Average Yield of 18 Cows Infected with Streptococcus Agalactiae for Seven Days Before and Seven Days after Treatment with Sodium Penicillin
Average daily decrease in production was 6.01 lb. or 2.54 per cent



Three cows with seven positive quarters possessed pendulous udders in which slight fibrosis was detectable. Four quarters became negative after one treatment, while three quarters required a second 25,000-unit infusion.

became negative after one treatment, and one required two treatments.

The optimum dosage and frequency in treatment of streptococcic mastitis with penicillin was not established. The single treatment has obvious advantages; however

the final criterion will depend primarily upon the rate of absorption or elimination of penicillin from the mammary tissue. The results of this study indicate the antibacterial action of penicillin continues over a sufficient interval of time to eliminate the streptococci in a majority of the infected quarters. On the other hand, it appears possible that the most effective results may be obtained by continuous treatment, *i.e.*, maintaining the antibacterial level of penicillin in the udder for a sufficient number of hours to destroy all pathogenic streptococci.

A total of 1,825,000 units of penicillin sodium was used in the course of 71 treatments in infected quarters. Based on present prices, penicillin may be considered highly satisfactory as an economical therapeutic agent in streptococcic mastitis.

Table 2 presents the average daily milk production of 18 treated cows for seven days before treatment and seven days following treatment. Cows were in all stages of lactation from the first month to the seventeenth month and were producing from 55 lb. per day to 8 lb. per day. Milk production returned to pretreatment level after the first seven days, during which time total decrease in daily milk production for the 18 treated cows was 6.01 lb. (2.54%).

SUMMARY

The udder infusion of 25,000 units of sodium penicillin in each quarter proved to be relatively nonirritating. Milk production diminished only 2.54 per cent the week following treatment.

Twenty-seven positive quarters (61.36%) became negative after one udder infusion; seven positive quarters (15.9%) required two udder infusions, and three quarters (6.81%) required three udder infusions before becoming negative. Seven quarters (15.9%) remained positive following three separate udder infusions of penicillin at intervals of twelve and fourteen days.

Fourteen of 18 positive cows became negative, while 4 cows remained positive as judged by microscopical and bacteriological examinations one month after treatment.

Therapeutic results did not correlate with the number of lactations which varied from first to fifth or with the stage of lactation which varied from the first month to the seventeenth month.

Equally good results were obtained regardless of the condition of the udder or pathological change which had developed within the udder.

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Poll evil and quittor were practically nonexistent in mules of the British Army, and hoof sections were discontinued because the results were not satisfactory and a permanent cure could not be achieved.

Fistula of the withers was common; the use of sulfonamide drugs hastened healing of these cases.

A muting process for mules was completely successful in silencing more than 8,000 mules. This was an important factor when mules were used in advanced positions. A number of roaring operations also were performed, with entirely favorable results.—*Lt. Col. C. H. S. Townsend, Vet. Rec.,57,* (1945): 542.

Electric pig brooders will save an average of 1.5 pigs per litter, when pigs are kept in a farrowing house two weeks.

This freedom will not be important when men are not dying for it.—*George Washington at Valley Forge.*

Concentration of Hog-Cholera Virus in the Blood of Artificially Infected Swine at Different Stages of the Disease

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ALTHOUGH hog-cholera virus is produced on an extensive scale, little is known regarding the relative amounts of virus in the blood of virus pigs on different days following inoculation. Previously reported investigations[1] indicated that the period from the sixth to eighth day following inoculation was the most favorable time to draw blood for use in preparing anti-hog-cholera serum and for use in simultaneous inoculation. However, in those investigations only one dose (1/300,000 cc.) was used, and no attempt was made to measure the relative amount of virus in the blood of virus pigs on different days following inoculation.

Results of experiments concerning the minimum lethal dose have been published by King and Wilson,[2] Roderick and Schalk,[3] McBryde,[4] Powick,[5] and others. These investigators have reported the production of hog cholera by the injection of virus in doses ranging from 1/215 cc. to 1/400,000 cc. Smaller minimum lethal doses, reported in this paper, have been found in work conducted at the Ames, Iowa, experiment station of the Pathological Division, U. S. Bureau of Animal Industry.

EXPERIMENTAL

Three different experiments were carried out. The general plan of all of these experiments was the same; namely, to inject 1 or 2 susceptible pigs with a 2-cc. dose of hog-cholera virus; to draw blood from each injected pig, or virus donor, at two or more subsequent intervals; to make serial dilutions of the blood on the bleeding day; and to test the virulence of some of the higher dilutions by injecting a 5-cc. dose into each of 2 susceptible pigs.

All virus donors and virus test pigs used were farrowed by nonimmune sows and were used when they weighed between 40 and 90 lb. One hundred and fourteen pigs were used in these three experiments. They were obtained from five different farms located in southern Iowa and northern Missouri and were delivered by truck to the experiment station. All pigs were kept under observation for ten days, and each lot was tested for susceptibility before being used in experiments. The five lots used in these experiments were designated G, H, I, O, and P. The origins of these five lots of pigs, so far as could be ascertained, were as follows:

Lot G—Humphries, Mo.
Lot H—Unionville, Mo.
Lot I—Exact origin unknown.
Lot O—Chariton, Iowa.
Lot P—Pollock, Mo.

Pigs selected as virus donors were infected by subcutaneous injection of 2 cc. of a phenolized virus prepared at Ames, Iowa, for use in experimental work.

Blood for virulence tests was drawn from the hog-cholera-infected pigs, or virus donors, from the anterior vena cava, from the tail, or, at the final bleeding, by severing the jugular vein and carotid artery with a cannula knife. All dilutions were made on the day that the virus-blood was drawn. All equipment was sterilized, and the measuring pipettes and volumetric flasks used had been certified by the Bureau of Standards. The smallest aliquot taken for dilution was 5 cc., and separate equipment was used for each dilution. The diluent was sterile physiological salt solution (0.85 per cent sodium chloride C.P. in distilled water). The dilutions were planned so that a 5-cc. test dose would contain the fraction of original virus-blood desired for test, and all tests for virulence were made on the same day the blood was drawn and diluted. Two pigs were used to test the virulence of the blood from each donor for each dose. The test pigs were placed in clean disinfected pens, and precautions were taken to prevent accidental infection. Experimental pens are so constructed that they can not be entered. Feed, water, and bedding are put in through high narrow doors, and a separate shovel is used for cleaning each

From the Bureau of Animal Industry, Agricultural Research Administration, USDA, Ames, Iowa.

pen. The distance between pens varies from 10 to 40 ft. Attendants are trained to prevent carrying any infective material from one pen to another.

With few exceptions, each test pig was kept in a separate pen. Exceptions, whenever they occurred in an experiment, are noted in the detailed description of that experiment. In general, all pigs that received doses less than 1/250,000 cc. were kept alone in a single pen.

Experiment 1.—Two pigs (323 and 324) from different sources, identified as lots G and H, were each injected with regular BAI virus 228. On the fourth, sixth, and eighth days following virus injection, each of the pigs was bled; the blood was defibrinated, and a 5-cc. portion was taken for serial dilution in accordance with scheme 1.

Dilutions D, E, and F were used for test in 5-cc. doses, thus affording doses of 1/25,000 cc., 1/250,000 cc., and 1/750,000 cc., respectively, of original virus. Two pigs were used for each dose. All test pigs were from the same source, lot G. Each pair of pigs that received 1/25,000 cc. was penned together. Each pig that received a smaller dose was kept in a separate pen. Results are shown in table 1.

Scheme 1

Aliquot Taken	Original Virus-Blood in Aliquot (cc.)	Diluent Added to Make (cc.)	Original Virus-Blood After Dilution (In 1 cc.)	(In 5 cc.)	Dilution Designated
5 cc. of virus	5	250	1/50		A
10 cc. dilution A	1/5	100	1/500		B
10 cc. dilution B	1/50	100	1/5,000		C
10 cc. dilution C	1/500	250	1/125,000	1/25,000	D
5 cc. dilution D	1/25,000	50	1/1,250,000	1/250,000	E
25 cc. dilution E	1/50,000	75	1/3,750,000	1/750,000	F

On the fourteenth day of the test, the 7 survivors were each injected with 2 cc. of hog-cholera virus 228. All developed cholera and died or were killed when moribund. In this test, the blood drawn on the fourth day was less virulent than the blood drawn on the sixth or eighth day after inoculation. On the sixth and eighth days after inoculation, virus was obtained from 2 pigs from two different sources, which produced cholera in a dose of 1/750,000 cc.

Scheme 2

Aliquot Taken	Original Virus-Blood in Aliquot (cc.)	Diluent Added to Make (cc.)	Original Virus-Blood After Dilution (In 1 cc.)	(In 5 cc.)	Dilution Designated
10 cc. dilution D	1/12,500	100	1/1,250,000	1/250,000	E
25 cc. dilution E	1/50,000	50	1/2,500,000	1/500,000	F
25 cc. dilution F	1/100,000	50	1/5,000,000	1/1,000,000	G

Experiment 2.—Two pigs (372 and 373) from lots G and H used in experiment 1,

Scheme 3 and 4

Aliquot Taken	Original Virus-Blood in Aliquot (cc.)	Diluent Added to Make (cc.)	Original Virus-Blood After Dilution (In 1 cc.)	(In 5 cc.)	Dilution Designated
3rd-day bleeding					
5 cc. of virus	5	250	1/50	1/10	A
10 cc. dilution A	1/5	1000	1/5,000	1/1,000	B
10 cc. dilution B	1/500	250	1/125,000	1/25,000	C
10 cc. dilution C	1/12,500	100	1/1,250,000	1/250,000	D
25 cc. dilution D	1/50,000	100	1/5,000,000	1/1,000,000	E
5th- 7th- and 9th-day bleedings					
5 cc. of virus	5	250	1/50	1/10	A
5 cc. dilution A	1/10	1000	1/10,000	1/2,000	B
10 cc. dilution B	1/1,000	250	1/250,000	1/50,000	C
20 cc. dilution C	1/12,500	100	1/1,250,000	1/250,000	D
25 cc. dilution D	1/50,000	100	1/5,000,000	1/1,000,000	E
10 cc. dilution D	1/125,000	100	1/12,500,000	1/2,500,000	F
25 cc. dilution F	1/500,000	50	1/25,000,000	1/5,000,000	G
25 cc. dilution G	1/1,000,000	50	1/50,000,000	1/10,000,000	H

TABLE 1—Titration of Virus-Blood of 2 Pigs Drawn on the Fourth, Sixth, and Eighth Days Following Injection of Hog-Cholera Virus

Hog Cholera Virus Donor Pig	Day Blood Drawn	Amt. of Blood Injected (cc.)	No. of Pigs Injected	Results of Injection: Day Sick After Inoculation	Results of Injection: Day Died or Killed Moribund After Inoculation
323	4th	1/ 25,000	2*	5th	12th
		1/250,000	2	One on 6th	17th
				One normal	
		1/750,000	2	Normal	
	6th	1/ 25,000	2*	One on 5th	15th
				One on 4th	15th
		1/250,000	2	One on 9th	11th
				One on 9th	18th
		1/750,000	2	One on 6th	18th
				One on 6th	16th
	8th	1/ 25,000	2*	One on 5th	12th
				One on 5th	17th
		1/250,000	2	One on 4th	10th
				One on 4th	17th
		1/750,000	2	One on 8th	18th
				One on 6th	15th
324	4th	1/ 25,000	2*	5th	18th
		1/250,000	2	Normal	
		1/750,000	2	Normal	
	6th	1/ 25,000	2*	One on 3rd	14th
				One on 6th	11th
		1/250,000	2	One on 4th	14th
				One on 5th	11th
		1/750,000	2	One on 4th	16th
				One on 4th	18th
	8th	1/ 25,000	2*	4th	13th
		1/250,000	2	One on 8th	14th
				One on 5th	Recov.
		1/750,000	2	One on 4th	12th
				One on 5th	15th

*Both pigs were penned together; all others were kept in separate pens.

TABLE 2—Titration of Virus-Blood of 2 Pigs Drawn on the Third, Sixth, and Ninth Days Following Injection of Hog-Cholera Virus

Hog Cholera Virus Donor Pig	Day Blood Drawn	Amt. of Blood Injected (cc.)	No. of Pigs Injected	Results of Injection: Day Sick After Inoculation	Results of Injection: Day Died or Killed Moribund After Inoculation
372	3rd	1/250,000	2*	Normal	
		1/500,000	2	Normal	
		1/1,000,000	2	Normal	
	6th	1/250,000	2*	One on 4th	18th
				One on 5th	10th
		1/500,000	2	One on 4th	14th
				One on 3rd	9th
		1/1,000,000	2	One on 4th	11th
				One on 4th	8th
	9th	1/250,000	2*	One on 15th†	36th
				One on 6th	31st
		1/500,000	2	One on 5th	20th
				One on 5th	21st
		1/1,000,000	2	One normal	
				One on 3rd	13th
373	3rd	1/250,000	2*	Normal	
		1/500,000	2	Normal	
		1/1,000,000	2	Normal	
	6th	1/250,000	2*	One on 6th	16th
				One on 6th	10th
		1/500,000	2	One on 5th	14th
				One on 3rd	12th
		1/1,000,000	2	One on 5th	16th
				One on 5th	11th
	9th	1/250,000	2*	One on 10th	15th
				One on 10th	16th
		1/500,000	2	One on 4th	12th
				One on 8th	16th
		1/1,000,000	2	One normal	
				One on 5th	11th

*Both pigs were penned together; all others were kept in separate pens.

†This pig probably sickened from contact with pen mate.

were each injected with the same virus, BAI virus 228 used in experiment 1. Bleedings were made on the third, sixth, and ninth days, and portions of each pig's blood were diluted for test. Dilutions A, B, C, and D in this test were made in the same way that dilutions A, B, C, and D were made in experiment 1. The higher dilutions in this test were made in accordance with scheme 2.

Dilutions E, F, and G were used for test in 5-cc. doses, thus affording doses of 1/250,000 cc., 1/500,000 cc., and 1/1,000,000 cc., respectively, of original virus. One pig given each dose was from lot H, and one was from lot I. Each pair of pigs that received 1/250,000 cc. was penned together. Each pig that received a smaller dose was kept in a separate pen. Results are shown in table 2.

The 12 survivors after injection of blood drawn on the third day and the 2 survivors after injection of blood drawn on the ninth day were each injected with 2 cc. of BAI virus 229. All died except 1 pig which had been injected first with the 1/1,000,000-cc. dose of blood drawn on the ninth day from donor 373. That pig remained normal after receiving 2 cc. of virus 229.

In addition to the tests shown in table 2, blood drawn on the third day from each donor was tested in 2-cc. doses, after being phenolized and refrigerated for nineteen days. Two pigs were used to test each blood. All injected pigs developed cholera and died.

The results indicate that although acute cholera was produced with 2-cc. doses of the blood drawn on the third day, this blood was measurably less virulent than blood drawn on the sixth and ninth days. Accord-

TABLE 3—Titration of Virus-Blood of 1 Pig Drawn on the Third, Fifth, Seventh, and Ninth Days Following Injection of Hog-Cholera Virus

Hog Cholera Virus Donor Pig	Day Blood Drawn	Amt. of Blood Injected (cc.)	No. of Pigs Injected	Results of Injection: Day Sick After Inoculation	Results of Injection: Day Died or Killed Moribund After Inoculation
616	3rd	1/25,000	2*	One on 14th†	35th
				One on 6th	11th
		1/250,000	2*	Normal	
		1/1,000,000	2*	Normal	
	5th	1/250,000	2*	One on 5th	14th
				One on 12th†	28th
		1/1,000,000	2	Normal	
		1/2,500,000	2	Normal	
		1/5,000,000	2	One normal	
				One on 5th	21st
		1/10,000,000	2	Normal	
	7th	1/250,000	2*	One on 5th	28th‡
				One on 10th	Recovered‡
		1/1,000,000	2	One on 4th	13th
				One on 7th	24th
		1/2,500,000	2	One on 7th	Recovered§
				One on 5th	Recovered§
		1/5,000,000	2	Normal	
		1/10,000,000	2	Normal	
	9th	1/250,000	2*	Normal	
		1/1,000,000	2	Normal	
		1/2,500,000	2	Normal	
		1/5,000,000	2	Normal	
		1/10,000,000	2	Normal	

*Both pigs were penned together; all others, were kept in separate pens.

†These pigs probably sickened from contact with pen mates.

‡These pigs were in the same pen. The pig that died became sick on the fifth day and died on the twenty-eighth day. The pig that recovered became sick on the tenth day; it remained normal when later injected with hog-cholera virus.

§Both remained well when later injected with hog-cholera virus.

ing to the results with the 1/1,000,000-cc. doses, the blood drawn on the ninth day was apparently less virulent than the blood drawn on the sixth day. The minimum lethal dose indicated for the blood drawn on the sixth day was 1/1,000,000 cc. or less.

Experiment 3.—The 1 donor pig (616), selected from lot O, used in this experiment, was injected with 2 cc. of BAI virus 231 and was bled on the third, fifth, seventh, and ninth days following injection.

Dilutions were made in accordance with schemes 3 and 4.

The blood drawn on the third day was tested in doses containing 1/25,000 cc., 1/250,000 cc., and 1/1,000,000 cc. of original virus-blood. The blood drawn on the fifth, seventh, and ninth days was tested in doses containing 1/250,000 cc., 1/1,000,000 cc., 1/2,500,000 cc., 1/5,000,000 cc., and 1/10,000,000 cc. of original virus-blood. Two pigs were used for each dose. Each pair of pigs injected with blood drawn on the third day and each pair injected with 1/250,000 cc. of blood drawn on the fifth, seventh, and ninth days were penned together. Each pig that received a smaller dose than 1/250,000 cc. of blood drawn on the fifth, seventh, and ninth days was kept in a separate pen. One pig given each dose was from lot O, and 1 was from lot P. Results are shown in table 3.

Each of the 25 pigs that remained normal following the injection of diluted blood from virus donor 616 were later injected with 2 cc. of virus of known virulence. All developed cholera and died or were killed for virus.

The 3 pigs that sickened but recovered after injection of diluted blood were later injected with virus of known virulence and remained normal. They had apparently been immunized or possessed considerable natural resistance. The blood drawn on the seventh day was distinctly more virulent than the blood drawn on the third, fifth, or ninth day, except in the case of the pig injected with blood drawn on the fifth day, in a dose corresponding to 1/5,000,000 cc. of original virus. In that case accidental exposure is suspected.

In this experiment, as in experiment 2, a minimum lethal dose of 1/1,000,000 cc. is indicated. However, cholera was produced in 2 pigs with a dose of 1/2,500,000 cc. The failure to produce cholera with any dilution of the blood drawn on the ninth day is noteworthy.

SUMMARY

Each of 5 pigs were injected with 2 cc. of regular BAI hog-cholera virus and were bled at different intervals ranging from three to nine days after injection. Various dilutions were made of each blood, and selected dilutions were tested for virulence in doses ranging from 1/25,000 cc. to 1/10,000,000 cc. of the original virus-blood. All pigs that remained normal following injection of the diluted fractions were later injected with a known virulent virus, and all developed cholera, and with few exceptions, all died or were killed for virus. Necropsies were held on all pigs that died or were killed, and with one exception, all

showed lesions characteristic of hog cholera. Evidence obtained indicated that blood from cholera-infected pigs contains the most virus when drawn on the sixth to eighth day inclusive. With the use of blood drawn on the sixth to ninth day, hog cholera was produced in 8 pigs injected with 1/500,000 cc., in 8 pigs injected with 1/750,000 cc., in 8 pigs injected with 1/1,000,000 cc., and in 2 pigs injected with 1/2,500,000 cc.

Of 6 pigs injected with 1/5,000,000 cc., 5 remained normal, and 1 developed cholera, due perhaps to accidental exposure. Of 6 injected with 1/10,000,000 cc., all remained normal.

A minimum lethal dose between 1/1,000,000 cc. and 1/2,500,000 cc. of virus was indicated.

ACKNOWLEDGMENT

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A good disease-control program will increase livestock profits, and the initial cost should be listed as a production cost.

Laying hens consume about 1 quart of water for each pound of feed, or about 6 gallons per day for 100 layers.

Antibiotic agents were known in India in the fifth century (B.C.), when garlic was used as a local application to reduce the severity of boils.—*Dr. I. F. Huddleson.*

A single application of DDT, sprayed or dipped, proved effective in ridding swine of heavy infestations of lice, in limited trials under farm conditions by USDA research veterinarians.

The Very First Step in American Veterinary Education

When Robert Jennings chartered the first veterinary college in North America at Philadelphia in 1852, the number of graduate veterinarians in the United States (pop. 25,000,000) totaled around 50, all in the larger cities of the East. Its name was "Philadelphia Veterinary College." The project did not long survive, because practitioners protested against making more veterinarians on the familiar ground that there were already too many.

Besides, there were difficulties met in maintaining a competent faculty at little or no pay derived exclusively from the small tuition of the small number of students the college was able to enroll. Veterinary surgeons were few and, unfortunately, quarrelsome in the nineteenth century. There was no profession, in fact, to cultivate professional spirit and fraternity. The college closed after three or four years of hopeless effort, but nevertheless gave the country its first group of graduate veterinarians. Their names may never be known unless some curious-enough veterinary historian scans the newspapers and farm magazines of the middle 1850's in the forlorn hope of finding them. The records of the college disappeared with the founding of the AVMA which, until the 1890's, wasn't famous for the keeping of records.

In 1855, Robert Jennings wrote: "This is the dawn of a new era," in the *American Veterinary Journal*, the first veterinary magazine in this country.

Foot-and-Mouth Disease in England

Mr. T. Williams reported in Parliament that there had been 122 outbreaks of foot-and-mouth disease in Great Britain in 1945, of which 60 had been original (not traceable to neighboring trouble). Pigs were the first animals affected in 56 of these original outbreaks, and swill had been fairly definitely established as the source of the virus in 29 of them. Not a single outbreak was reported in areas where swill from American camps was fed.—*Vet. Rec., 57,* (1945): 532.

You can't be a howling success just by howling.

SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

A Newly Developed Anesthetic for Horses

MAJOR EDGAR W. MILLENBRUCK, V.C., and
LIEUT. MERRILL H. WALLINGA, V.C.
United States Army

THE SEARCH at Fort Riley, Kansas, for a new and better general anesthetic for the horse has led to the discovery of an intravenous anesthetic having a desirable action and relatively low cost.

The necessary research was fully endorsed by the Post Veterinarian, Col. J. E. Behney, who realized the need for improvement.

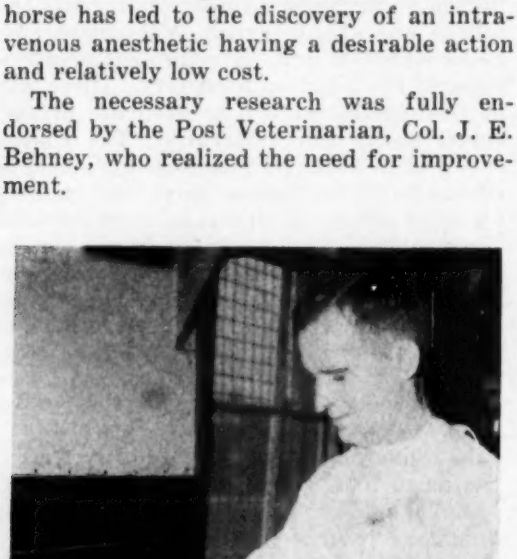

Fig. 1—The solution must be prepared within an hour before administration.

ANESTHETICS PREVIOUSLY USED

Prior to the discovery of the new product, several different anesthetics were tried. Not one was satisfactory in all phases.

When chloroform was used as a general anesthetic, only a short period followed narcosis before the animal was back to normal, and chloroform necessitates a skilled anesthetist to avoid danger of toxicity or over-anesthesia.

Chloral hydrate was undesirable because of the excessive floundering during the excitement stage and again during the period of recovery. The toxicity of this product is high for complete anesthesia, so it must be used with caution.

Anesthetization with chloral hydrate (2 parts) and magnesium sulfate (1 part) proved somewhat satisfactory, for the excitement stage was cut down, especially in the phlegmatic type of animal. However, in the younger, more nervous type where the dose had to be sufficient to induce narcosis, the respiration became very irregular. In one case of a 1,240 lb. young Thoroughbred given 1.5 oz. of chloral hydrate and 0.75 oz. of magnesium sulfate, the horse died of respiratory failure. The slow recovery still ranged from one and a half to three hours.

Pentobarbital sodium was a satisfactory drug for the operative period because of its long range of safety. A tooth repulsion was performed on a horse after which the horse was given an additional 25 gr. with no apparent toxicity. In another case where the animal was anesthetized for surgery, 50 gr. was given. The complete immobility produced by this anesthetic for a long period makes it particularly desirable for long operations. Since approximately 175 to 225 gr. of pentobarbital sodium must be used

for each animal, the cost is almost prohibitive. This anesthetic also caused the horse to go through a stage of excitement which resulted in decubitus ulcers on the prominent points of the body, and did not eliminate the slow recovery.

A safe and fairly good method, especially if the operation is to take a considerable length of time, was found when chloral hydrate (1.0 oz.) and magnesium sulfate (0.5 oz.) per 1,000 lb. of body weight was given and then followed with 75 to 100 gr. of pentobarbital sodium. The excitement stage appeared to be the same as that experienced with chloral hydrate only. A long recovery period with floundering also contributed to making this method not completely satisfactory.

THE NEWLY DEVELOPED ANESTHETIC

Ingredients Used.—The solution which proved to be the most successful is the new anesthetic which consists of chloral hydrate (1.0 oz.), magnesium sulfate (0.5 oz.), pentobarbital sodium (100 gr.), and distilled water to make 1,000 cc. Although various combinations of these ingredients have been tried since, no solution works as well as the original mixture. A precipitate forms in this solution within one to ten hours, depending on the temperature.

Preparation.—It is necessary to prepare the drug within an hour before administration in order to prevent precipitation which occurs as a result of a reaction between the chloral hydrate and the pentobarbital sodium. Since magnesium sulfate alone does not precipitate with either of the other ingredients, the drug can be prepared readily by keeping the pentobarbital sodium in one solution and the chloral hydrate and magnesium sulfate in another solution mixed in proportions so that the dosage is easily computed. A method found to be convenient at Fort Riley is to keep a stock solution composed of 1.0 oz. pentobarbital sodium (453 gr.) dissolved in 906 cc. of distilled water in the refrigerator. Then, whenever a horse is presented for general anesthesia, the chloral hydrate and magnesium sulfate crystals are weighed and put into the intravenous bottle. Distilled water is added to make 800 cc. after which 200 cc. of pentobarbital sodium stock solution is added.

Administration.—The prepared solution is given very slowly in the jugular vein by means of gravity flow, utilizing a 15-gauge needle and simplex intravenous outfit until the horse begins to stagger. Then, the flow is increased until the horse is ready to fall. The needle is removed as the horse is falling.

Fig. 2—The solution is given in the jugular vein.

Excitement Stage.—The absence of an excitement stage is one of the most important advantages of the new anesthetic. Approximately four minutes should be allowed for the anesthetic to act before the horse goes down. In a 1,000 lb. horse, the bottle is held at shoulder height for about three minutes, allowing about 325 cc. to gravitate into the vein. When the horse begins to lose muscular coördination, the bottle is raised to arm length so that as much as possible will flow in before the horse collapses. Effort should be made to keep the horse on his feet as long as possible. Then, when the horse has fallen, the halter rope should be held tightly for a short time so that he does not attempt to rise. In the event that he does rise, the needle must be reinserted into the jugular vein, and the solution injected until the

proper narcosis is reached. The nystagmus and corneal reflex are the predominant guides for determining the dosage. When the oscillatory movement of the eyeball al-

Fig. 3—Sometimes the needle must be reinserted into the jugular vein and the solution injected until proper narcosis is reached.

most stops and the animal takes a deep breath, the stage of surgical anesthesia has been reached.

Period of Surgical Anesthesia.—There is complete immobility during the short period of surgical anesthesia. With the small dose required to get only a slight corneal reflex, the surgical stage lasts about thirty minutes. Since the length of the profound narcosis can be controlled by the amount administered, more or less is given in accordance with the operation to be performed. In cases where immobility is desired for x-ray work or operations of short duration, a minimum dose will keep the horse under complete anesthesia for only fifteen to thirty minutes, whereas an additional 15 gr. will keep the horse in that stage for forty to sixty minutes.

Period of Collapse or Complete Intoxication.—The period of collapse or complete intoxication has not been a factor of concern because of the low toxicity. No special care has been taken to stop the administration until the surgical stage is reached. The new product has been used on approximately 50 cases without a death.

Period of Recovery.—The patients recover rapidly and regain consciousness at about the same rate that they regain muscular coördination. The throwing of the head and floundering that is particularly noticeable with pentobarbital sodium or chloral hydrate is absent. The horse seldom makes an attempt to rise unless he is capable of doing so. The time required for a horse to stand after an injection is usually about one and a half hours. For long operations where it is necessary to use a maxi-

Fig. 4—There is complete immobility for repulsion of a tooth.

mum dose there is a tendency toward bloating, apparently caused by fermentation in the colon and rectum. After the horse rises, a large quantity of flatus passes, but there is no danger of any intestinal disturbances.

Toxicity.—The toxicity is quite negligible, and the range of safety appears to be 100 per cent over the average dose. The average dose administered in all the cases carefully recorded consisted of 67 gr. pentobarbital sodium, 20 Gm. chloral hydrate, and 10 Gm. magnesium sulfate. A horse which happened to weigh 1,090 lb., the average weight of all the horses used, was given twice the average dose and still lived in a profound narcosis on two breaths per minute. It was found in 4 other horses that with 100 per cent larger dose than would have been required for ordinary surgery, the animal was in deep narcosis. When the dose was exceeded by more than 100 per cent, respiratory failure resulted, and circulation continued until the animal died of asphyxiation.

ECONOMICAL USE OF THE ANESTHETIC

The economical use of the newly developed anesthetic depends largely upon the cost of pentobarbital sodium, which can be purchased from the manufacturer in powder form at a rate so reasonable that a 1,100 lb. horse can be anesthetized for less than one dollar.

No specialized equipment other than an ordinary intravenous outfit is necessary for the administration. Neither are expensive operating tables and casting harnesses necessary, for restraint is complete without an excitement stage. Veterinarians who do not have such equipment or who are unable to take a case where equipment is available will find this an extremely desirable feature.

Economy also exists in the limited manpower necessary. The veterinarian and an assistant to hold the halter rope serve as adequate manpower when using this drug. However, an additional man to steady the horse so that he remains upright as long as possible is beneficial. No one needs to attend the animal during recovery.

SUMMARY

1) The drug has low toxicity. There is approximately a 100 per cent margin of safety over the amount required for complete narcosis.

2) Since the excitement stage is negligible or completely absent, the use of the anesthetic is safe for animal, veterinarian, and assistant. Vicious and nervous animals become completely comatose before undergoing narcosis and do not rebel against the effects of the drug.

3) The period of surgical anesthesia is short and complete.

4) The recovery period is rapid. Floundering which might cause injury has been eliminated in this stage.

5) The limited manpower and equipment required make it possible for every practitioner to use this formula.

6) The cost of the anesthetic is low enough for practical use on any case requiring it.

Frothy Bloat

Having read about, and used, the method described by Dr. Seagraves (JOURNAL, 107, (1945): 73), I should like to discuss a method which has been easier and more satisfactory for me. An 8 in. trocar, 1/2 in. in diameter, is inserted in the rumen through a puncture in the left flank. A trocar of smaller diameter but 15 in. long is passed through the first instrument, and water is pumped into the mass through this smaller trocar. In the course of four or five hours, 15 to 25 gal. of lukewarm water are pumped into the mass, 1 to 3 gal. at a time, using the inner tip of the trocar to break up the feed mass and to siphon out the liquid.

When there is no more distress or danger from bloat, 4 to 6 lb. of Epsom salts is introduced into the rumen, and 500 cc. of calcium gluconate is injected into the jugular vein.

This treatment has worked well also when the rumen was overloaded with newly threshed wheat or oats, or with green corn. There have been no nasty abscesses to heal, and the cows are usually back to normal in two or three days.—*L. E. Thompson, M.D.C., Waxahachie, Texas.*

The size of the litter farrowed was increased with the age of the dam at mating time, sows 1 year old averaging one pig more than gilts 320 days of age, and one pig less than sows 410 days old. The size of the dam was also a factor, the heavier gilt farrowing the larger litter.—*From J. Anim. Sci., August, 1945.*

Anomalous Posterior Vena Cava of a Dog

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THE POSTERIOR vena cava is formed by the converging of the right and left common iliac veins.

The veins from the hind limbs and pelvis converge to form the right and left external iliac and internal iliac (hypogastric of Bradley) veins. These veins converge to form the right and left common iliac veins, respectively, which in turn join to form the posterior vena cava.

The vena cava usually begins on a level with the last lumbar vertebra, runs forward at the right of the aorta, and passes between the liver and the diaphragm to reach the foramen vena cava, through which it enters the thoracic cavity. In the thoracic cavity, it is enclosed in a fold of pleura (caval fold) and passes through a notch in the right lung to reach the right atrium.

In the specimen under discussion, the vena cava passed forward under the right kidney, occupying a deep furrow in that organ. Then, instead of passing between the liver and diaphragm, it passed through the right lumbo-costal arch to join with, or to be continued as, the vena azygos, to terminate at the usual location of the vena azygos in the right atrium.

The hepatic and phrenic veins formed a large vein which reached the heart by the course usually occupied by the vena cava.

Key to Photograph

(1) Origin of aorta; (2) End of vena azygos et posterior vena cava; (3) Esophagus turned to left; (4, 4) aorta; (5, 5', 5") vena cava; (6) Diaphragm turned aside to expose lumbo-costal arch; (7) origin of vena azygos; (8) left kidney; (9) right kidney; (10) renal arteries; (11) left renal vein; (12) external iliac arteries; (13) internal iliac arteries; (14) right and left common iliac veins; (15) circumflex iliac vessels.

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Liquid manure contains the soluble and readily available plant nutrients.

Effects of Stilbestrol on Pyometra Following Retained Fetal Membranes

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AMONG THE COMMON causes of sterility in cattle are functional abnormalities of the ovaries, uterine infections, retained placentae, and associated metritis and pyometra. While much has been written on these subjects, there are still many gaps in our information. A surprising lack of critical research on the proper clinical management of these pathological conditions is evident to anyone who has reviewed the literature. Most of the therapeutic measures advocated for their alleviation are empirical.

It is always difficult to measure the value of any therapeutic measure. This is particularly true in bovine genital disease. The high cost of experimental animals, their slow rate of reproduction, and the expensive equipment necessary to maintain them precludes formal controlled experimentation. Any attempt to evaluate therapeutic measures in this field must rely on clinical observations on animals over which there is not always complete jurisdiction. Clients seldom agree to experimentation on their valuable livestock, and all too frequently the clinician is unable to follow the records of treated animals, the histories of which would be revealing.

The author has had the opportunity to treat the genital disease problems of several dairy herds in which he was able to make repeated examinations of animals that had been treated and to carry on a limited amount of experimentation. The purpose of this paper is to report the results of a study, in these herds, of the therapeutic value of stilbestrol in the treatment of the pyometra which invariably follows the manual removal of retained fetal membranes.

Review of Literature

During the past five years, many reports of the clinical uses of stilbestrol have appeared in the literature. In a theoretical discussion of the inter-relationships between estrogens, progesterone, and the pituitary with their effects on the uterus, Brownlee (1942) called attention to the fact that when estrogens reach a sufficiently high concentration, they cause regression of the corpus luteum and simultaneously sensitize the uterus to the oxytocic principle of the pituitary body.

Golledge (1942) reported on the use of stilbestrol in a case of hydrops amnii, and Rowson and Spriggs (1942) recommended stilbestrol in the treatment of pyometra of cattle, in doses of 20 to 25 mg. They stated that in suitable cases pus began to discharge in twenty-four hours and continued until the uterus was empty. They presented no data of a critical nature.

Since that time, both English and American veterinarians have used stilbestrol and its derivatives quite extensively in the treatment of anestrus, retention of the fetal membranes, mummified fetus, pyometra, and retention of the corpus luteum. Few of them have included specific data in their reports, most of which are of isolated clinical cases involving many uncontrolled factors. There is still much work to be done before all of the uses of stilbestrol in cattle practice can be properly evaluated.

Material and Methods

For this study, 43 cows with retained placentae were selected from herds on which breeding records were kept and on which repeated examinations were made. The placentae were removed manually when examination revealed that it was practical to do so. None was removed in less than seventy-two hours after parturition, and some remained as long as 148 hours before it was considered advisable to remove them. In no case was the uterus irrigated, and the only other treatment was to place a 1-oz. gelatin capsule of powdered sulfanilamide deep in each horn of the uterus.

Each case was examined approximately two weeks later. By this time it was found that all symptoms of acute inflammation had subsided, but that in all cases a pyometra was present as evidenced by the presence of pus in the uterus and by retarded involution.

At this time, a single dose of from 30 to 50 mg. of stilbestrol, depending on the size of the cow, was administered intramuscularly, and the patient was observed daily thereafter until results were noted. If no results were observed in seventy-two hours, the treatment was repeated.

All cows in this experiment were bred at the first estrual period after the sixtieth day follow-

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ing parturition and were bred at each succeeding estrus until conception occurred.

For comparison of the results, the records of these same herds for previous years were examined and 50 retained placenta cases were selected at random in which the breeding record of the cow was complete following treatment. Data on the post-treatment breeding records of these cows are presented in table 1.

TABLE 1—Time from Parturition to Conception Following Retained Placentae in 50 Cows Not Treated with Stilbestrol at Any Time

Parturition to Conception (Days)	No. of Cows Conceiving	Cow Days
60- 70	0	0
70- 80	1	75
80- 90	2	170
90-100	1	95
100-120	5	550
120-140	8	1,040
140-160	14	2,100
160-180	6	1,020
180-200	5	950
Over 200 7*	1*	228
Total	43	6,228
Average days per conception		144.8
Per cent left sterile		14.0

*Seven of the 50 cows were eventually discarded as sterile. The other conceived 228 days following parturition.

RESULTS

Of the 43 cows treated, 14 showed signs of estrus behavior in twenty-four hours after injection, 21 in forty-eight hours, and 5 in seventy-two hours, making a total of 40 (93%) that came in heat within seventy-two hours after the injection of a single dose of from 30 to 50 mg. of stilbestrol. Two required a second injection and 1 aged cow showed only vague symptoms of heat even after a third injection.

All of the 42 cows coming in heat following the first or second injection began discharging pus from the uterus soon after the first symptoms. In from two to seven days from the advent of estrus, all uteri were empty and involution proceeded rapidly. Rectal examination during the stilbestrol induced estrus revealed that the tubular genitalia possessed excellent tone and were erectile. Inspection of the cervices through a vaginal speculum revealed them to be open in all cases.

In the cow in which three injections were needed, estrual symptoms were never well pronounced. Several examinations were made during the course of treatment. All showed the cervix to be rather tightly closed and the uterus was atonic at all times. Later, a cervical catheter was passed and the uterus irrigated. She finally came into estrus sixty-five days after parturition. Estrual cycles were fairly regular thereafter but after being bred at each of ten heat periods, she was finally discarded as incurably sterile.

Forty-two of these cows conceived in from sixty to 140 days following parturition (table 2). None was bred in less than sixty days from calving. Eight conceived in less than seventy days, 10 in from seventy to eighty days, 11 in from eighty to ninety days, 5 in from ninety to 100 days, 5 in from 100 to 120 days, and the remaining 3 in less than 140 days for a total of 3,620 cow days from calving to conception for the 42 cows. The average time required for each conception was eighty-six and two-tenths days.

TABLE 2—Time from Parturition to Conception of 43 Cows Following Treatment with Stilbestrol for Pyometra Following Retention of the Fetal Membranes

Parturition to Conception (Days)	No. of Cows Conceiving	Cow Days
60- 70	8	520
70- 80	10	750
80- 90	11	935
90-100	5	475
100-120	5	550
120-140	3	390
Over 140	1*	...
Total	43	3,620
Average days per conception		86.2
Per cent of cows left sterile		2.33

*Sterile.

Of the 43 cows, 1 (2.33%) failed to conceive and was discarded as incurably sterile. Of the 42 that became pregnant, 24 conceived at the first service; 10 required two services, and the remaining 8 conceived on the third service. The average was 1.62 services per conception.

Of the 50 control cases in table 1, none conceived in less than seventy days, 1 in from seventy to eighty days, 2 in from eighty to ninety days, 3 in from ninety to 100 days, 5 in from 100 to 120 days, 8 in from 120 to 140 days, 14 in from 140 to 160 days, 6 in from 160 to 180 days, 5 in from 180 to 200 days, and 1 at 228 days. Seven (14.0%) failed to conceive and were eventually discarded for that reason. The total cow days for the 43 cows that conceived was 6,228. The average time from parturition to conception was 144.8 days as compared to eighty-six and two-tenths days

for the stilbestrol treated cows. The difference in the average is fifty-eight and six-tenths days.

DISCUSSION

No matter how much care is exercised in removing a retained placenta manually, a certain amount of débris is left behind. If bacteria were not already present in the uterus, they are introduced with the arm. The endometrium is irritated and traumatized by the manipulation, and the resulting inflammation gives rise to a catarrhal exudate. The atonic uterus is unable to expel this accumulation which then acts as a deciduoma causing retention of the corpus luteum of pregnancy, closure of the cervix, and retention of the putrid, liquefying material. Eventually, the corpus luteum regresses; estrus ensues; the uterus is emptied, and the condition is relieved. However, the process is a slow one, and frequently, during the interval, the endometrium undergoes so much change as to destroy its ability to support a future conception, and the cow becomes sterile. In less severe cases, the animal remains in poor health for a long time; breeding is delayed, and in a large percentage of cases, the succeeding pregnancy is pathological.

Several years ago, the author attempted treatment of these cases by expressing the corpus luteum. When this was accomplished, estrus followed in a few days and recovery from the pyometra was prompt. However, it was not always possible to accomplish the enucleation of the corpus luteum, which at this stage has sunk deeply into the ovary, and all too frequently the operation caused enough traumatism to induce an ovaritis. Follow up examinations revealed that in a large percentage of cases the ovary adhered to the broad ligament, the abdominal wall, or the pavilion of the oviduct following this treatment.

The advent of stilbestrol has placed at the disposal of the veterinarian a powerful estrogen that can be marketed at a price that makes its use feasible where its effects are beneficial. The treatment of the pyometra which invariably follows the manual removal of retained placentae would seem to be one of these.

Treatment of the 43 cows in this experiment with stilbestrol resulted in 42 (97.8%) of the cows retaining their fertility as compared to 43 out of 50 (86%) that conceived again in the control group. In the stilbestrol treated cases, an average of eighty-six and two-tenths days elapsed between parturition and conception. In the control group the average period from parturition to conception was 144.8 days.

CONCLUSION

From the results of this experiment it was concluded that stilbestrol has marked therapeutic value in the treatment of the pyometra which follows the manual removal of retained placentae in cows.

SUMMARY

Forty-three cows suffering from pyometra following the manual removal of retained placentae were treated with stilbestrol two weeks after removal. In this group 97.8 per cent retained their fertility as compared to 86 per cent in a control group of 50 cows. In the controls, an average of 144.8 days per cow elapsed from parturition to the next conception following treatment, while only eight-six and two-tenths days on the average elapsed in the treated group.

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The Future of Artificial Breeding

K. L. Hatch (*Wisconsin Holstein News*, Nov., 1945) predicts that one of the big stumbling blocks facing artificial insemination is the fact that it eliminates the search by breeders for a sire. This periodic search for new blood he considers an important factor in maintaining the enthusiasm of breeders of purebred cattle because in hunting a sire, a breeder, especially a young breeder, is inspired by seeing good herds and by visiting with successful men in his own field of endeavor.

Absolute Sterility

D. N. Spriggs, a sterility officer, presents his experiences with absolute sterility in dairy cows (*Vet. Rec.*, Oct. 20, 1945). He lists as causes of reproductive failure: cicatricial adhesions in the ovarian region, gross indurations of various parts of the reproductive tract, long-standing pyometra, advanced nymphomania, and incomplete genital tract. Cicatricial adhesions are most numerous, and in the etiology of such adhesions he finds them: following retained placenta, following pyometra or a history of pus discharge, associated with cysts, as a result of rough rectal manipulation, as a result of tuberculosis infection, associated with brucellosis, and many times when no cause is apparent.

Rabbits may be remated when the young are 21 days old; the young then are weaned at 6 weeks of age. In this way, a doe may raise five litters a year; some does have survived under this program for eight years. The doe should raise not more than 8 young per litter, which means that she may produce 110 lb. of meat per year. One man can take care of 300 does, and the meat should sell for about 20 cents per pound.

An Embryonal Mixed Tumor in the Lungs of a Calf

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THE LIMITED number of embryonal mixed tumors of cattle reported in the literature indicates that such tumors are uncommon in the bovine species. Jackson[1] reported 6 cases among 108 tumors of cattle. Five were embryonal nephromas, and one was a malignant cortical adrenal tumor of embryonal character, derived from the corticogenic mesoderm. Although mixed tumors and teratomas containing striated muscle are mentioned under the heading of rhabdomyoma in textbooks of pathology,[2, 3] Jackson's (Onderstepoört) collection of animal neoplasms does not include rhabdomyomas of any species. In Feldman's[4] series of 230 tumors in cattle, there was one embryonal mixed tumor which was an embryonal nephroma.

The purpose of this report is to describe an embryonal mixed tumor in the lungs of a calf. The case was observed on June 15, 1945, at an abattoir in Buffalo, N. Y., by Drs. J. J. Martin and J. A. Gallagher, of the Meat Inspection Division, USDA. A specimen from the case was shipped to the Pathological Division of the Bureau for laboratory diagnosis. Unfortunately, the unfixed tissues were not received until advanced postmortem changes had taken place. As a result, many of the histologic details were obscured, but the laboratory findings, nevertheless, were considered to be of sufficient interest to warrant a report of the case.

GROSS DESCRIPTION

The specimen consisted of a large portion of one lung and an attached piece of tissue resembling a lymph node from a 12-week-old male calf. The postmortem notes stated that all other body tissues and organs were apparently normal. The lung contained numerous soft, yellowish-grey tumor nodules ranging from 2 mm. to 1 cm. in diameter. On incision, the color and consistency of the nodules suggested a lymphoid tumor. The attached lymph node was soft and appeared somewhat enlarged. Numerous small cavities were observed in some areas of the lung tissue. These were thought to signify pulmonary emphysema. Subsequent histologic examination showed that many were cystic cavities within tumor nodules.

HISTOLOGIC EXAMINATION

Microscopic study under low magnification showed that the larger nodules occupied an entire pulmonary lobule. In such instances, the advancing growth appeared to be pushing against the lobular boundaries without breaking through the interlobular septa. The smaller nodules which occupied only a portion of a pulmonary lobule appeared to be growing by invasion of the alveolar walls, with subsequent destruction of the normal lobular architecture. Some of the tumor nodules were solid, but many contained variable numbers of cystic cavities.

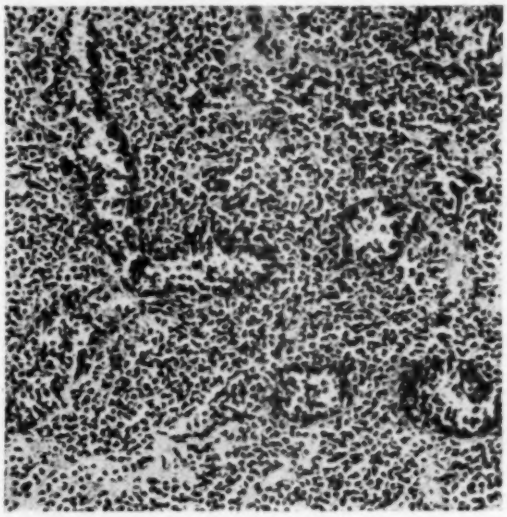

Fig. 1—Section of a solid tumor nodule showing undifferentiated cells and tubules. x250.

Study under higher magnification showed that the solid nodules were composed chiefly

From the Pathological Division, Bureau of Animal Industry, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C.

of small and medium sized undifferentiated cells (fig. 1) with a rounded or irregular contour. The nucleus, which appeared pyknotic on account of post mortem changes, was round or oval and occupied a

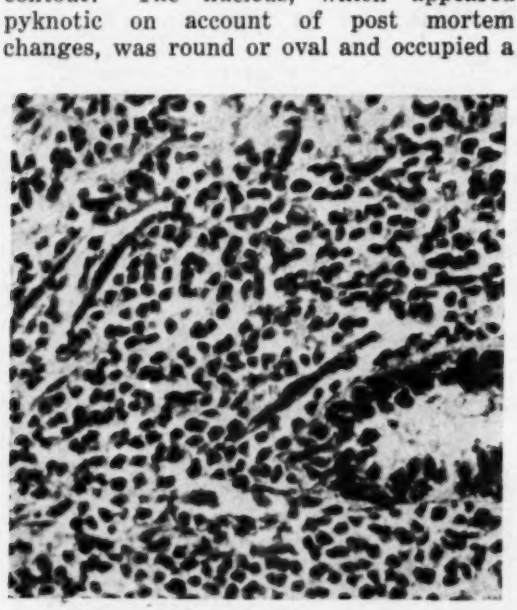

Fig. 2—Section of a solid tumor nodule showing undifferentiated cells, cells with ribbon-like contours (muscle cells), and a portion of a tubule. x350.

major portion of the cell volume. The scant cytoplasm stained poorly and in many cells was not clearly shown.

Scattered throughout the small undifferentiated cells were larger cells with narrow ribbon-like contours (fig. 2) suggesting muscle fibers. The cytoplasm, stained with eosin, was more or less abundant and in some instances contained cross striations. The nucleus was centrally placed, and despite marked post mortem deterioration, it could be seen that more than one nucleus was present in some of the cells.

Many of the tumor nodules in the lung tissue also contained narrow, tubular structures scattered about, which appeared to be a part of the neoplastic process. These tubules, also shown in figure 1, were lined with one or more layers of cells resembling cuboidal epithelium resting on a base composed of loosely meshed connective tissue.

The stroma of the tumor consisted of an interlacing network of loosely arranged connective tissue. This divided the densely packed undifferentiated cells and muscle cells into groups or nests and also surrounded the tubular formations. In sections stained by Mallory's modification of Heidenhain's method for connective tissue, a moderate amount of fibrous reticulum was seen among the cells. Silver stains for reticulum fibers were not attempted in this case. Both the solid tumor nodules and the cystic ones contained fewer elastic fibers than the unaffected lung tissue. Elastic fibers were scant or absent around the tubular formations which failed, in that respect, to compare with bronchioles in the unaffected lung tissue.

The cystic tumor nodules resembled the solid ones with the exceptions that variable numbers of large cysts were present and that muscle cells were generally more numerous among the neoplastic elements (fig. 3). In a few nodules observed, there were many cysts separated from one another by only a narrow wall of tissue. Some cysts

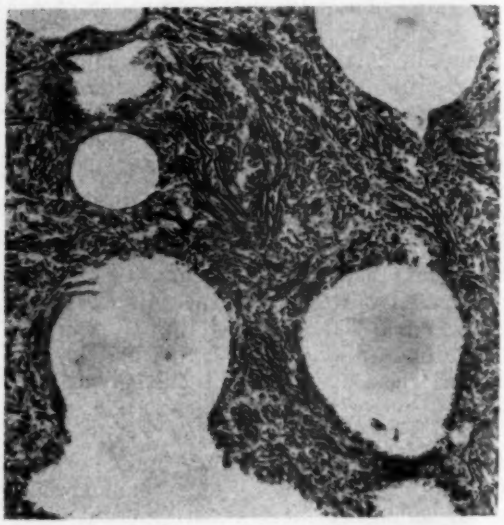

Fig. 3—Section of a clystic tumor nodule showing numerous muscle cells. x120.

were lined by cuboidal or flattened cells—others were devoid of a demonstrable cellular lining. The content of the cysts appeared to be air. It was not clear whether the cysts were a part of the neoplasm or merely represented air spaces in the tissue resulting from differences in the growth pattern of the various nodules. In the author's opinion, the latter viewpoint seems to afford a logical explanation.

All of the neoplastic cell types observed in the solid nodules were present in the cystic ones, except that in the latter the muscular elements were generally more numerous. Some areas were observed in

which the neoplastic tissue was composed of muscle cells and a framework of connective tissue. In such areas, the muscle cells appeared to be in a more advanced stage of differentiation. Some were rather long, and cross striations could be seen in many (fig. 4). One and, frequently, two or three centrally located nuclei were present. When multiple, the nuclei were grouped in linear arrangement parallel to the long axis of the cell.

Fig. 4—High magnification photograph of a section of the same tumor nodule as shown in figure 3. x750. Note the striated muscle cells.

On microscopic study of the lymph node, it was found that the small undifferentiated tumor cells could not be definitely distinguished from lymphoid elements of the node under the conditions of advanced postmortem change. However, the presence of a few muscle cells in the sections gave evidence of lymph-node involvement.

DISCUSSION

This unusual tumor presented a problem of diagnosis and classification. The mixed composition of the growth, namely, the presence of striated muscle cells, undifferentiated cells, and epithelial tubules was regarded as indicating a mixed tumor (false mixed tumor according to Jackson[1]).

The microscopic appearance of the cells and the age of the calf were regarded as suggesting a derivation from embryonal structures. The diagnosis, therefore, was an embryonal mixed tumor in the lungs of a calf.

A similar tumor occurring in the lungs of a 4- or 5-months-old lamb was designated as a rhabdomyoma in a report by Day[5]. In that case, the lungs contained numerous tumor nodules composed predominantly of striated muscle cells, although in some places there was a stroma of small round and irregular (undifferentiated) cells constituting not more than 25 per cent of the microscopic field. Numerous circular openings (lumens) lined with large cuboidal cells were present throughout the growth. Day did not believe that these tubules were remnants of lung tissue, yet regarded his tumor as a "rhabdomyoma in the strictest sense of the word." He suggested that the neoplasm was derived from misplaced embryonal tissue, the glandular elements probably being remnants of the Wolffian body, and the striated muscle cells probably being derived from inclusions of the myotome, which were not separated at the proper place in early embryonal life.

Concerning the present case, the differentiation from a teratoma was based on the criteria given by Ewing.[6] He states, "In general, one may follow the rule of designating as mixed tumors growths in which embryonal and blastomatous features are prominent, and grouping as teratomas those growths in which structure is more complex and rudimentary organs are present."

Several observers suggested that the tumor nodules in this case may have been metastatic, possibly originating from a single embryonal growth elsewhere, as an embryonal nephroma. Clinical evidence to support this viewpoint was not reported.

Concerning malignancy, the presence of muscle cells in the sections of lymph node suggests that the myomatous element of the tumor was undergoing malignant transformation.

SUMMARY

An embryonal mixed tumor in the lungs of a 12-week-old calf is described. Grossly, the tumor appeared as numerous solid and cystic nodules ranging in diameter from 2 mm. to 1 cm. The histologic structure consisted of a mixture of undifferentiated

cells, striated muscle cells, and epithelial cells arranged in tubular formations.

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Gallstones in a Dog

A 10-year-old German Shepherd dog was presented for a postmortem examination. This animal died suddenly for no apparent reason, and the owner, suspicious of poisoning, desired an autopsy.

The organs were somewhat decomposed so that accurate interpretation of the pathology was impossible. However, there was an engorgement of the spleen, some emphysema of the lungs, and a fatty degeneration of the liver. The gastrointestinal tract was distended with gases of putrefaction, and the mucosa was badly discolored by decomposition. It was decided that the animal had died of natural causes, more so because of the extremely hot July weather.

On opening the gall bladder, we found it contained 13 stones; the largest was approximately 0.5 cm. in diameter, while the rest were small, flat, oblong stones, about 0.25 cm. wide and nearly 0.5 cm. long. The wall of the gall bladder was somewhat thickened.

It is interesting to note that this dog did not suffer any attacks of icterus during its lifetime and that gallstones were not suspected. The majority of the reported cases on record were discovered accidentally.

Gallstones are not common in dogs, especially cases severe enough to cause symptoms, although Brumley[1] describes the symptoms and operative technique. The incidence is not definitely known as few reports can be found. Schlotthauer and Stalker[2] reported 2 cases out of 155 dogs examined during routine necropsy. Schlotthauer[3] has also recently published a report reviewing the 4 cases seen by him during twenty years of practice, one of which showed symptoms. Gauss and Davis[4] reported a 1 per cent incidence in cattle during the inspection of 2,067 unselected animals slaughtered for food. Doster-Virtue and Virtue[5] report 1 case during the course of preparing a bile fistula in an English Setter for experimental purposes.

An article by Volkmar[6] gives a comprehensive review of the etiology and symptomatology of the disease. Hutyra, Marek, and Manninger[7] also review the subject in detail, claiming that horses and cattle are most frequently affected, dogs more rarely, and cats, swine, and sheep only exceptionally. Muller and Glass[8] also mention the condition.

Our purpose in reporting this case is to substantiate the evidence so far presented for the occurrence of gallstones in dogs.—*Joseph A. S. Millar, V.M.D., B.S., and Daniel W. Hubbard, V.M.D., Deal, New Jersey.*

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Equine Surgery

Mules are used more frequently in the Army than are horses, because they are more hardy and require less surgery. There is a growing tendency among military men to conclude that once a mule develops lameness from any bone trouble it is best to dispose of the animal, since treatment is usually unsatisfactory and uneconomic.

A technique has been developed for aiding in the diagnosis of lameness by injecting a local anesthetic into the joint cavities. The procedure is particularly effective in shoulder and stifle lameness.

CLINICAL DATA

Some Highlights from Recent Meetings

Forty-Second Annual Convention, Kansas Veterinary Medical Association, Jan. 14-15, 1946

Be careful about the use of hog-cholera virus on pigs with scours—it is often a good policy to give plenty of serum and then administer virus seven days later.—*Dr. J. B. Gingery.*

Of all the pigs raised, one-third make a profit, one-third break even, and one-third lose money.—*Dr. E. L. Dicke.*

The meat and poultry inspection bill was the biggest and most valuable project sponsored and supported by the Kansas Veterinary Medical Association in 1945.—*Dr. G. A. Rathman.*

Clipping interesting items and filing them for ready reference are two steps in a program for keeping one's self up to date. —*Dr. F. H. Suits.*

The general practitioner must learn to handle poultry problems on a flock basis—therefore he must see and study the flock. —*Dr. F. R. Beaudette.*

Prompt filing of adequate reports is essential for good coöperation between the practicing veterinarian and the regulatory official.—*Mr. Will J. Miller.*

Calves and adults officially vaccinated against brucellosis should be permanently identified, and the greatest advantage, financial and otherwise, will accrue to the owner of a negative animal so identified. —*Dr. W. E. Logan.*

• • •

Conference of Illinois State Employed Veterinarians and Disease Control Officials, Jan. 16, 1946

Tuberculous hens often can be recognized on gross examination because they grow long claws.—*Dr. A. B. Crawford.*

When you control the movement of the affected or exposed animal, you control tuberculosis.—*Dr. A. K. Kuttler.*

Cows infected with tuberculosis, when injected with tuberculin, respond with an increased leucocyte count in the blood.—*Dr. P. D. Beamer.*

Anthrax and rabies have brought human and veterinary medicine together; recent findings in nuclear physics emphasize the unity of the two fields.—*R. B. Allen, M.D.*

• • •

Sixty-Fourth Annual Meeting, Illinois State Veterinary Medical Association, Jan. 17-18, 1946

Veterinarians have failed to appreciate the potency of their political force and responsibilities.—*Senator S. E. Lantz.*

The Illinois Mastitis Control Program, in which 60 private practitioners are now working, has enrolled 637 herds, of which only 1 was entirely clean on initial survey, but of which 80 are now clean.—*Dr. Robert Graham.*

Less than 10 per cent of mastitis develops without infection, and less than 5 per cent of the infectious mastitis occurs in the acute form.—*Dr. B. L. Lake.*

The fundamentals of accurate diagnosis and good management are not as exciting as some new drug or treatment—but they are much more important.—*Dr. M. E. Boyer.*

Artificial insemination is a large and growing project in which the animal health aspects are important. Therefore, the veterinarian who neglects it is not meeting his obligation to the dairymen of his community.—*Dr. W. C. Glenney.*

Use of DDT to Control Sarcoptic Mange

EARL N. MOORE, B.Sc., D.V.M.
Newark, Delaware

SINCE DDT is now available for general use there is need for research work to demonstrate its uses as well as its limitations. It was with this thought in mind that a homeless, mongrel pup about 4 months of age was used to determine the efficacy of this drug as a treatment for mange. In addition to having a generalized case of sarcoptic mange, this dog also was treated for internal parasites. There was some indication that the pup might have had distemper but nothing other than symptomatic treatment was used to overcome these symptoms.

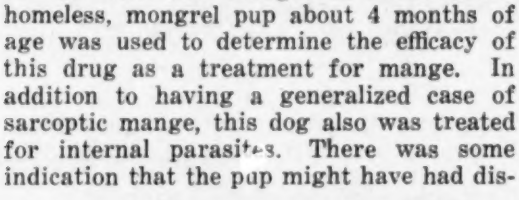

Fig. 1—Appearance of the pup before treatment with DDT.

After a definite diagnosis of sarcoptic mange was made microscopically, a 3 per cent DDT powder was obtained and used in this form over the entire body twice a week. Each time, before applying the powder, a bath with warm, soapy water removed the desquamated epithelium and exudate. It was thought that this would permit the powder to come in closer contact with the parasites. Olive oil was used on the skin about once a week to improve the scaly skin condition. Following its use, the powder was found to be retained longer on the skin.

This treatment was continued for four and one-half months, when the dog appeared normal and had developed a nice coat of hair, as the accompanying photograph (fig. 2) shows. No further treatment was given until three weeks later. At this time, the dog again exhibited clinical evidence of mites, which was substantiated by microscopic examination. Following the use of three treatments with a 5 per cent DDT powder, applied over the entire body at intervals of one week, the dog again showed improvement.

Even though this pup had a severe, generalized case of sarcoptic mange, improvement was noticed following a few applications of DDT. However, it was apparent after a few weeks that the powder failed to penetrate the skin and follicles sufficiently to contact all the mites. The use of a light, oily vehicle would undoubtedly have proved beneficial in destroying the mites, but this might have resulted in sufficient absorption of DDT through the skin to produce a toxic condition in the host. It is evident that the powder is not too effective and that additional research is needed to develop a satisfactory vehicle which will not prove toxic.

Fig. 2—Appearance of the pup following four and one-half months of treatment.

Sulfamerazine as a Prophylactic in Pullorum Disease in Poults

F. E. MULLEN, B.S., V.M.D.
Harrisonburg, Virginia

THE EFFECT of various sulfonamides on pullorum disease in the chick has recently been studied.[1] Two of these sulfonamides, sulfadiazine and sulfamerazine, gave such promising results that an effort was made to determine the effect of one of these drugs on naturally infected cases.

Several outbreaks of pullorum disease in turkeys had occurred, and owners of breeding flocks were suffering undue hardships. Although able to retest breeding flocks and remove reactors, it was financially impossible to destroy eggs already in incubators.

There were three questions to be answered: (1) Would the sulfonamide reduce death losses? (2) Would it be profitable to use the drug? (3) How long a period need it be used?

Materials and Methods

The drug chosen was sulfamerazine. Both sulfadiazine and sulfamerazine gave good results on the original trials. However, sulfadiazine was used in a 2.0 per cent concentration, and although slightly cheaper per pound at this time, it was more expensive to use than the sulfamerazine which was used at a 0.5 per cent concentration in the mash. The owners of the birds paid for all drugs used.

The poults were newly hatched from eggs laid by breeders whose previous eggs had produced poults found to have pullorum. The disease was diagnosed in the poults by the isolation of *Salmonella pullorum* from the livers and/or intestines.

Management was commercial. The growers accepted the poults and managed them in the same way they had managed previous lots. In the lots in which one portion was left untreated, all poults were in one building, a feed room separating the treated from the untreated birds. All lots were on different farms. The count of the dead birds was done by the caretaker. Since the author did not count the dead birds or see most of them, this could be a point of contention. However, since rebates were paid to the owners by the hatchery or breeding flock owner in cases of undue loss, it is felt that this figure would tend to be higher rather than lower.

The birds were started on the treated mash from the first day. The growers used their own systems to induce the birds to eat. Some used marbles, rolled oats, fine corn, etc. The mash was continued for five days and then the birds were changed to the untreated mash.

TABLE I—Results from Feeding Sulfamerazine-Treated Mash to Pullorum-Infected Poults

Case	Total Birds	Treated Birds	Untreated Birds	Loss in Treated %	Loss in Untreated %
1	1,700	1,000	700	3.3	15
2	1,750	850	800	3.0	09
3	2,137	900	1,237	5.0	16
4	1,987	1,037	950	4.0	12
5	3,406	1,206	2,200	5.0	11
6	1,742	1,000	742	2.2	32
7	4,500	1,500	3,000	3.5	26
8	1,200	1,200	...	2.5	..
9	943	943	...	3.0	..
10	2,100	2,100	...	3.0	..
11	1,500	1,500	...	8.0	..
Total	22,965	13,236	9,629	3.9	17

Discussion

The first question was answered very well. The sulfamerazine seemed to have a very favorable effect on the course of pullorum disease in a naturally infected group. In those lots in which it was possible to leave a portion untreated, there was an average difference in loss of almost 14.0 per cent. In those groups without control lots, the total average loss was 4.1 per cent. A difference of 10.0 per cent mortality the first two weeks may well mean the difference between profit and loss on the entire turkey project.

The second question is answered in the results obtained. The average price of poults was about 80 cents. The drug sold for approximately $22 a pound. At a concentration of 0.5 per cent, 1 lb. would treat 200 lb. of mash. This mash would feed about 2,000 turkeys for five days. This number of poults would cost about $1,600 and a saving of 10.0 per cent made by lowering the mortality would mean saving $160 by investing $22. This saving is merely in the purchase price of the poults and does

From the Department of Agriculture and Immigration, Regional Diagnostic Laboratory, Harrisonburg, Va.

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not take into account the probable amount of profit.

The treated mash seemed to have an adverse effect if fed for more than five days. Litter eating became widespread with resulting loss of poults. The birds seemed to wander around the pen in search of something. Discontinuing the treated mash lowered the amount of litter eating to no more than is usual with turkeys.

CONCLUSION

Sulfamerazine, when fed to poults from pullorum-infected breeding stock at a concentration of 0.5 per cent in the starting mash, had a definite effect on the mortality of the group.

Sulfamerazine in 0.5 per cent concentration should not be fed for more than five days.

Penicillin in Piroplasmosis of Dogs

History.—A female English Bulldog, 10 months old, had been vomiting, showing inappetence, and gradually losing flesh for several days.

Clinical Examination.—The animal was very thin and unthrifty; mucous membranes were extremely pale and icteric. Temperature was 95F.; there was some tendency toward posterior paralysis, and skin remained folded on pinching. The spleen was easily outlined through the abdominal wall, since it was very much enlarged and had rounded borders.

Laboratory Examination.—Blood cells were present in the urine. White blood cells (polymorphonuclear) were 40,000 per cc. and the red blood cell count was 2,000,000 per cc. Practically all red blood cells examined showed Piroplasma. Hemoglobin was 30 on standard scale.

Note.—The owner was a qualified technician in a diagnostic laboratory. We took advantage of this fact and had our findings checked.

Treatment.—After making a diagnosis of piroplasmosis, 8,000 units of penicillin were administered intravenously every three hours until six doses had been given. This treatment was repeated on the second and third days. On the fourth day, 500 cc. of whole blood from a canine donor was given intraperitoneally.

During the course of the treatment, the animal showed marked improvement; hemoglobin reading was 60 on the third day of treatment and 80 on the fourth day before the blood transfusion was given. Perceptible receding in the size of the spleen was noted after the fourth day, with improvement in the color of the mucous membrane. Paralytic tendency disappeared with improvement of appetite and general condition. The hemoglobin scale showed 95 on August 11, which was seventeen days after the start of the treatment. This upgrade continued uninterruptedly, and the dog had gained 10 lb. twenty days after a period of treatment.

We regard this case as unusual and encouraging. We still have plenty of losses, and we hope penicillin and other new drugs will reduce our over-all mortality.—*U. E. Marney, D.V.M., R. A. Culpepper, D.V.M., and H. C. Gale, D.V.S., San Antonio, Texas.*

Penicillin in Mastitis of Cows

Observations on the use of penicillin in the treatment of bovine mastitis, which have been reported in recent publications, begin to establish the intramammary dosage required to obtain the maximum percentage of cures, and they also rule out the systemic use of the drug in mammary infections. The trials of Bryan, Huffman, and Horwood (*Vet. Med.*, March, 1945), of Seely, Anderson, and Plastridge (*Science*, July 15, 1945), of Parker and Dussault (*Canad. J. Comp. Med.*, Dec., 1945) amply confirm the low permeability of the bovine mammary gland to circulating penicillin, and the trials of Schalm (*Vet. Student*, Fall, 1945), of Jasper and Weirether (*ibid.*), of Murnane (*Aust. Vet. J.*, Aug., 1945), and the various articles currently published in the JOURNAL confirm equally well the high place penicillin is destined to occupy in the clinical veterinary medicine of the future.

The results credited to one, two, three, and four intramammary infusions ranging from 10,000 to 50,000 Oxford units, in treating mastitis caused by *Streptococcus agalactiae* have been quite definitely established. According to the number and the size of the dosage, the cures reported range from 26 per cent to 97 per cent of the affected udders treated. Moreover, the low toxic and irritant properties ascribed are promising. In the face of the facts disclosed by controlled trials, penicillin came into the practice of veterinary medicine at an opportune time. The high incidence of bovine mastitis, its depressing effect on milk production, and the growing interest in hygienic milk and milk products, place the discovery of penicillin among the great contributions to animal production.

Eye-Worms in a German Shepherd

JOE RIDGWAY, D.V.M.
Altadena, California

A GERMAN Shepherd, 6 years old, was entered in the hospital August 1. Except for refusing food the night before, he had never been sick. He was listless, panting, and tired easily. The eyes were watery and were found to contain small, whitish, thread-like worms, 1/2 to 1 in. long, in the conjunctiva, which upon removal were found to resemble *Thelazia californiensis*. The dog was given penicillin, 4 cc. and Neoprontosil, 5 cc.; an ointment of zinc sulfathiazole was applied to the eyes. A blood sample was negative for microfilariae. The course of treatment was as follows:

August 2.—10:00 a. m. temperature, 101.8; eyes were washed with boric acid solution and then with butyn sulfate solution, and metaphen ointment was applied. 1:00 p. m.: temperature, 102; pulse, 150; respiration, 80 to 100; enlarged and inflamed tonsil was painted with metaphen; fecal examination for worm eggs negative. 1:30 p. m.: second blood examination for microfilariae negative. 3:00 p. m.: drank water and urinated normally. 4:30 p. m.: temperature, 101.4; ate a little food. 5:00 p. m.: was given an enema and 2 cc. concentrated vitamin B_1 and niacin.

August 3.—10:00 a. m.: temperature, 101; respiration, 100; pulse, 130; local anesthetic was applied, and more worms were removed; was given 2 cc. of concentrated vitamin B_1 and niacin; tonsil was swabbed. 1:00 p. m.: vomited green beans, celery, grass, and chyme; discharging from both nostrils; temperature, 102.6; was given penicillin 5 cc. and concentrated vitamin B_1 and niacin.

August 4.—9:00 a. m.: temperature, 104; respiration, 52; pulse, 130; walked outdoors, drank water, and jumped back into his cage quite normally except for stiffness in hind legs; was given penicillin, 5 cc.; arycyl (an arsenical), 1 cc.; liver extract, 1 cc.; and concentrated vitamin B_1 and niacin, 4 cc. 1:00 p. m.: temperature, 105; was given penicillin 5 cc., vitamin B_1 4 cc., and sulfathiazole 46.2 gr. 5:00 p. m.: temperature, 103; was given 15 gr. sulfathiazole *per os*.

August 5.—10:00 a. m.: improvement; temperature, 101; drank a pint of milk; bowels moved; was given 5 cc. of concentrated vitamin B_1 and niacin. The dog was taken to another hospital where he was fed a milk diet for ten days, and the diagnosis of eye-worm infection was confirmed.

September 6.—Inquiry revealed that the dog had recovered.—*Joe Ridgway, D.V.M., Altadena, Calif.*

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This report was submitted for publication under the title "An Unusual Case." The revised title is used without insisting upon its exactitude, and the report is published on account of the poverty of reports on palpebra-conjunctival worms in American dogs. Whether or not the worms the Doctor removed belong to the genus Thelazia is left open, since their dimensions do not correspond to the brief descriptions of canine eye-worms in the literature. The complex medication may be ignored as a factor in the recovery, since palpebral filariasis in mammals responds to manual removal of the worms.—THE EDITORS.

Anemia in Man

Nutritional anemia in man is characterized by small cells of low hemoglobin content. Research work shows that an adequate diet is needed to prevent this condition, and that milk supplies all of the necessary elements with the exception of iron and copper.—*National Dairy Council, October, 1945.*

Streptomycin in Tuberculosis

Streptomycin hydrochloride, administered subcutaneously, had a marked suppressive effect on experimental pulmonary tuberculosis in mice. It was used at the rate of 120,000 units per kilogram of weight, and injections were made every six hours for twenty-eight days.—*Rev. of Tuber. 52, (Nov. 1945).*

An Observation of Dogs Transmitting Leptospirosis to Their Masters

Senthille, Bayo, and (Mrs.) Kolochine-Erber *(Bull. Acad., Vet., 18,* (July, 1945): 176-186) publish what appears to be the first authentic report of dogs transmitting leptospirosis to their owners.

The authors review the observations which led to the present knowledge of the canine disease formerly designated Stuttgart disease, canine typhus, and later Weil's disease, or canine leptospirosis.

In 1852, Hofer of Munich, Germany, described an acute intestinal affection under the name of *typhus der hunde,* although it was not until 1899, when Klett of Stuttgart observed the prevalance of a hemorrhagic gastroenteritis among the dogs of that city, that the name *Stuttgarter hundseuche,* or Stuttgart disease was coined. By gradual stages, the disease was recognized among dogs in other countries, first as a special entity and later as an infection due to *Leptospira icterohaemorrhagiae,* the specific agent of human leptospirosis. Dogs were first infected experimentally by Courmand and Durand in France in 1917. Dalling *et al.* in England (1925), Panisset and Verge in France (1925), and Jungherr (1937), Meyer (K. F.), Anderson and Eddie (1938), in the United States, in that chronological order, confirmed the nature of the disease in the canine species and they wrote comprehensive articles on their investigational work. Neither human nor canine leptospirosis *per se* were exciting much more than curiosity in this country even after the reports of Meyer, Anderson and Eddie were published in 1938. The disease was not regarded as a public health problem or of any particular consequence in canine medicine. For some, it was still *typhus der hunde.* Serious consideration of the disease is, therefore, an event of the 1940's. Up to this moment, the transfer of the spirochete to man in the fondling of dogs has not been stressed, generally, although Meyer (K. F.), and Kelser and Schoening point out the risk of exposure to the urine of dogs.

The cast of the drama in question comprised a man and his wife, a pair of adult dogs, male and female, and 2 pups, one born in May and one in December, 1944. Devoted to their dogs, fondling was habitual. Except that the bitch suffered attacks of eclampsia on two occasions postpartum, there was no pathological history that merited notice. The dogs were well cared for save that the pups were not kept famously clean. Their general health was good. Mr. A., the husband, fell sick Jan. 27, 1945, and Mrs. A. on February 9. In March, the physician, suspecting leptospirosis, requested that a veterinarian be called to examine the dogs. The following is a sketch of the case history:

Mr. A. was stricken suddenly January 27 with grippe-like symptoms: temperature 105 F., nervous excitation, mulberry-like eruptions, digestive saburra with toxi-infection. By February 9, the temperature had dropped to 102.2 F. and fluctuated between that and 100.4 for two weeks. Typhus was suspected but the usual signs did not develop. On the seventeenth day a sero-diagnosis for leptospirosis was doubtful but on the eighteenth day gave a reaction at 1: 50,000 for *L. icterohaemorrhagiae,* and 1 : 5,000,000 for *Leptospira canicola.* When Mrs. A. fell sick (Feb. 9), her symptoms were those of pulmonary hyperemia. On April 25, during convalescence, her serum gave a positive reaction for *L. canicola* at 1 : 40,000 and 1 : 10,000 for *L. icterohaemorrhagiae.*

The dogs were submitted to repeated blood and urine examinations. The serum of the *male* (6 years old), on March 30, reacted to *L. canicola* at 1 : 5,000 and to *L. icterohaemorrhagiae* at 1 : 500. A few Leptospira were present in the supernatant fluid of his centrifuged urine. The serum of the *bitch* (5 years old), on the same date, reacted to *L. canicola* at 1 : 100,000 and to *L. icterohaemorrhagiae* at 1 : 50,000. Masses of feeble Leptospira were isolated from the clot of her centrifuged urine. In serum saturated with an emulsion of *L. canicola,* the antibodies of both species disappeared at the same time. Similar agglutination reactions were obtained April 25 and slightly less feeble ones on May 12.

One of the *pups,* a female born in May 1944, was positive for *L. canicola* at 1 : 5,000 and for *L. icterohaemorrhagiae* at 1 : 50 on March 30. On April 23 and March 13, the urine was negative and no Leptospira could be isolated in smears from the clot of centrifuged urine but the supernatant fluid gave positive results at 1 : 100 for *L. icterohaemorrhagiae* and 1 : 1,000 for *L. canicola.*

The other *pup,* a male, born in December,

1944, showed numerous living Leptospira in its centrifuged urine and its serum gave positive reactions at 1 : 50,000 for *L. icterohaemorrhagiae* and at 1 : 200,000 for *L. canicola*. This pup had been sold to Mrs. P. who contracted the infection a month later. At the time of the report (June 1945), she was convalescent and her serum had extremely high agglutinating power: 1 : 50,000 for *L. icterohaemorrhagiae* and 1 : 200,000 for *L. canicola*.

Summarized, the serum of 2 dogs agglutinated *L. canicola* at very high titers and that of 2 other dogs at lower titers. The first 2 eliminated numerous Leptospira of that species in their urine though the 2 others showed fewer urinary parasites. The conclusions were drawn that leptospirosis, accentuated from the strain of parturition, infected their newborn puppies early, that the infection was transmitted by reason of the close attention (handling) given to the pups by the devoted owners, and that *L. canicola* was the cause of both the canine and human cases.

The analogy of leptospirosis and brucellosis is pointed. An animal, in which massive doses of an organism are compatible with general health, is the origin of the infection for man and the eradication of the disease in that animal (dog) is obviously the underlying factor in the epidemiology of the human disease. Moreover, spreading of the specific agents following the act of parturition are comparable. The authors agree with Charles Nicolle that leptospirosis is a disease of the future whose extension is already apparent.

Sodium Pentothal: Its Contraindications

During the early phases of the war, deaths from sodium pentothal anesthesia, hit or miss, ran so high that the question of discarding its use was raised by the Surgeon General's Office, despite its advantages in battlefield casualties. Later, the high mortality was traced to inexperience. Like any anesthetic, pentothal was found to have contraindications, as was to be expected from a drug having such a pronounced paralyzing action on the respiratory centers—the spot in the patient's body which the anesthetist watches with keen eyes. In pentothal anesthesia, respiration movements lose the stimulating action of carbon dioxide on the respiratory centers with resulting anoxia. The antidote for pentothal, therefore, is oxygen, not CO_2. The latter cannot act.

In short, pentothal was kept from being discarded by using it routinely with 2.5 per cent of oxygen and shifting to ether if the duration of the operation exceeded one-half to three-quarters of an hour. For the preanesthesia, atropine was found to be preferable to morphine.

Moreover, definite contraindications were worked out. All surgical anesthetics have their proper place. According to gleanings from current surgical literature, the chief contraindications of sodium pentothal anesthesia disclosed by the war are cervical and facial inflammations, gangrene toxemia, shock or anticipated shock, severe burns, copious blood loss, severe circulatory damage, and heavy dosage with morphine, plus any operation having a longer range of time than the action of pentothal, which barely surpasses thirty minutes.

There is more to general surgical anesthesia than just finding a vein or clapping on the muzzle. Anesthesia in itself, for major surgical work, is a state bordering on death, independent of the state brought about by the injury. When an injured dog is rushed into the surgery, one wonders whether all factors concerned are weighed before "shooting" the anesthetic, and then passing judgment on its unworthiness.

Derriengue is a form of rabies in which the victim is paralytic.—*Capt. J. H. Steele.*

The USDA estimates that stockmen save $10 million annually by using phenothiazine to rid their livestock of parasites.

The influenza vaccine now used by the Army is a single injection, chicken-embryo product. Experiments on its production were started in 1943.

According to recent reports in the field of ophthalmology, injections of insulin speed up the healing of corneal ulcers. Its action in this rôle is not known.

Wealth comes from what we do and what we produce, not from the monies we receive or spend.

Streptomycin

Waksman and his coworkers found that *Actinomyces griseus* possesses properties which make it useful in the production of a substance which inhibits or kills pathogenic acidfast bateria, particularly *Mycobacterium phlei* and *Mycobacterium tuberculosis*. Bacteria of this type have resisted the action of all types of sulfonamide drugs as well as all agents previously recognized. This antibacterial substance, called streptomycin, was found to be active against a variety of organisms, notably *Proteus vulgaris, Pseudomonas aeruginosa, Serratia marescens*, and the spore-forming aërobic *Bacillus mycoides*.

The production of streptomycin depends on the presence in the medium of a certain organic substance supplied by meat extracts. The most successful formula for growth consists of glucose 10 Gm.; peptone 5 Gm.; meat extract 5 Gm.; sodium chloride 5 Gm.; tap water 1000 cc. The final pH should be adjusted to range between 6.5 and 7.0.

There is considerable variation in the antibiotic potency of different strains of *A. griseus*, and this potency can be altered somewhat by cultural methods. However, a highly active strain retains its relatively superior potency for considerable periods of time under normal conditions.

Streptomycin is soluble in water but insoluble in ether, chloroform, and acetone. It can therefore be readily isolated in fairly pure form by dissolving it in water and precipitating with one of the other agents.

Assay and unitage must be understood when results are compared with those secured when penicillin is used, because altogether different standards have been established. An Oxford unit of penicillin represents much greater *in vitro* activity than does a streptomycin unit, but penicillin is measured against the sensitive *Staphylococcus aureus* while streptomycin is measured against the resistant *Escherichia coli*.

The action of streptomycin is bacteriostatic in low dilution and bactericidal in greater concentration. There is lysis of living cells, but no such action on dead bacteria. It is active against a variety of gram-positive and gram-negative organisms. In addition to those already mentioned the list includes *Eberthella typhosa, Pasteurella tularensis, Klebsiella pneumoniae, Brucella abortus, Salmonella schottmülleri, Hemophilus pertussis, Hemophilus influenzae*, and others.

Streptomycin is rapidly absorbed and rapidly excreted. The toxicity is low, but when observed it is suggestive of a histamine-like dyspnea. Prolonged administration to monkeys has resulted in fatty infiltration of the liver.

The substance controls *Shigella gallinarum* (fowl typhoid) and *Brucella abortus* in chicken embryos. It also controls *Diplococcus pneumoniae* and *Staphylococcus aureus* as well as *P. tularensis* in mice. It has given better results than any previous treatment against tuberculosis, but it still must be viewed with the utmost conservatism. It has been used to best advantage in those infections which are resistant to penicillin, sulfonamide, and serum therapy. To date there has been no evidence to indicate development of resistant or tolerant strains as a result of inadequate dosage.

In one group of experiments reported by Feldman, Hinshaw, and Mann (*Am. Rev. of Tuberc.*, Oct., 1945) 25 guinea pigs were treated and 24 remained as controls, after all had been experimentally infected with tuberculosis. The animals were brought to autopsy 166 days after treatment was started, but in the meantime, 17 (70%) of the untreated and only 2 (8%) of the treated guinea pigs had died. Nearly all of the untreated control pigs had severe, widely distributed tuberculosis. The treated animals had minimal tubercles, and 13 (52%) of them had neither macroscopic nor microscopic tuberculous lesions, while 9 (39%) gave a negative reaction on tuberculin test.

These workers conclude that the antibiotic, streptomycin, under the conditions imposed, was effective in resolving or suppressing established experimental tuberculous infections in guinea pigs. Treatment consisted of 6,000 units divided into 4 equal doses per day, and the toxicity at this level was low. The effect of treatment appeared to be suppressive rather than sterilizing, but any conjecture as to clinical potentialties appears to be unwise at this time. In 39 per cent of cases, a positive test was reversed following treatment.

Report on the Use of a New Acid-Ester Preparation in Certain Dermatological Conditions in Animals

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IN THIS paper, results are reported on a ten months' clinical study of a new preparation, Cerbinol,* the active ingredients of which are malic, salicylic and benzoic acids and their propylene glycol esters in a propylene glycol-water medium. The report deals only with the topical application of the product in cases of foot-rot in cattle and sheep, ringworm in cattle, and eczema and ear canker in dogs. Modifications of the drug for use in other conditions and administration by various routes are also being studied and will be reported on later.

The report covers 58 cases of foot-rot (50 in cattle and 8 in sheep), 38 cases of ringworm in cattle, 13 cases of eczema in dogs, and 5 cases of ear canker in dogs.

Typical case histories are given, indicating the methods of treatment employed and the results obtained. All animals were treated under ordinary conditions, and no attempt was made to select cases. Due to impassable road conditions in the winter of 1944-45, about 50 per cent of the cases treated on farms could not be followed up and are, therefore, not included in the totals reported here. All of the cases which required laboratory examinations to confirm clinical findings were checked by either the bacteriologist at the University of New Hampshire or by a trained technician in our own laboratory.

FOOT-ROT (NECROBACILLOSIS)

Fifty cases of foot-rot in cattle and 8 in sheep were treated. Some were mild, incipient infections while others were severe and of considerable duration (30 days or more) with resultant swelling and lameness.

The method of treatment was to wash the affected parts with an antiseptic solution (Cerbinol full strength may be used) and then to curette out all necrotic tissue. A cotton dressing soaked in the preparation was then placed over the infected area and securely bandaged around the hoof.

In the more severe cases with lameness present, great improvement was noted in two or three days and, clinically, all signs of infection were cleared up in from five to sixteen days.

The cases of ovine foot-rot were in 8 western sheep on one farm and were characterized by suppuration and necrosis between the claws. In the past, some cases in this flock had responded to treatment with copper sulfate but many cases became chronic and showed no improvement with any treatment. The 8 cases reported here were from this chronically affected group, and all responded to the Cerbinol treatment.

Case Report No. 1.—Holstein-Friesian cow, age 10 years. Foot-rot for eight months in right hind foot; left hind foot recently affected. It was decided to treat only the most severely affected (right hind) foot at first. The foot was cleaned; infected areas were curetted, and packs soaked with Cerbinol, full strength, were applied. A week later, the foot was considerably improved and the treatment was repeated. On the tenth day after initial treatment, there was no evidence of infection but the foot was believed permanently crippled by malformation. At this time, treatment of the left hind foot was begun with packs soaked in Cerbinol and repeated for three consecutive days. At the end of this time, the animal was pronounced clinically cured.

Case Report No. 2.—Holstein-Friesian yearling heifer. Foot-rot of both hind feet, with swelling in fetlock region and lameness of left hind foot. The feet were cleansed and packs soaked in Cerbinol, full strength, were bandaged to affected parts. This treatment was repeated daily by the herdsman for four days. At this time, all suppuration was gone and no lameness was present.

The herdsman was instructed to continue the treatment but failed to do so because

*Westbury Chemical Company, Inc., New York.

he considered the feet cured. The affected feet were then treated for three more days, at the end of which time, all signs of foot-rot had disappeared, including the lameness.

RINGWORM (TRICHOPHYTOSIS)

We have treated 38 cases of ringworm in dairy cattle with Cerbinol. Clinically, most cases showed dry, crusted, circinate lesions with loss of hair from the affected areas, which were most commonly on the face, neck, and ears. Laboratory confirmation was made by demonstrating the fungus microscopically in skin scrapings.

The treatment of these cases consisted of swabbing all lesions either once or twice daily with full strength Cerbinol. About one half of the cases were treated twice daily, the remainder once daily.

The majority of cases were clinically free of ringworm lesions within seven to ten days. After the first or second day, the crusts softened and about the fifth day began to scale off. By the tenth day, most of the lesions were gone and new hair growth was evident. It may be noted that the conditions in animals treated twice daily did not clear up any more rapidly than those treated once daily.

Case Report No. 3.—A Holstein-Friesian heifer showed crusty ringworm lesions entirely surrounding the left eye and a small lesion on the tip of the left ear. Scrapings taken from the lesions showed ringworm fungi on microscopic examination.

Cerbinol, full strength, was applied to the lesions once daily with cotton swabs. On the seventh day, the lesions were healed and new hair was growing in. The case was checked about three weeks later, at which time there was no evidence of ringworm and new hair had grown into the affected areas.

CANINE ECZEMA

In treating this disease in dogs with Cerbinol, it was found that moist eczema responded very well in a few days, whereas so-called dry eczema cases were more refractory.

In treating moist eczema, the procedure was to clip the hair around the affected areas and then to swab them once or twice daily with a full-strength solution of the product. Cases were cleared up clinically in from four to seven days, depending on the physical condition of the animal and the size of the affected areas. Without exception, the affected areas were cleaner and dryer within two to three days, with some scab formation. About two days later, the scabs would fall off, leaving a clean dry surface with new hair growth evident.

Case Report No. 4.—Moist eczema in an Irish Terrier. The affected area was about as large as the palm of the hand; the skin was red and irritated, and the hair had fallen out.

Full strength Cerbinol was swabbed on the affected area twice daily for four days, at the end of which time the area was clear and the dog was pronounced clinically cured.

Case Report No. 5.—Moist eczema in a Collie dog, with large red, weeping areas on the throat, back, and side.

Full strength Cerbinol was swabbed on all affected areas once daily for five days. At the end of this time, all signs of eczema were gone and the dog was pronounced clinically cured.

EAR CANKER (OTITIS EXTERNA)

In the past, our experience with the treatment of ear canker in dogs has been varied and, for the most part, unsatisfactory. In the use of Cerbinol for this condition, we have first cleaned out the infected ears thoroughly, and then swabbed the affected areas with the solution twice daily, followed by the instillation of a few drops into the ears.

Consistently satisfactory results have been obtained with this treatment, and cases have been discharged as clinically cured within from three to eight days. However, in ear canker cases of long standing that have developed so far as to require surgical procedures, this latter treatment is, naturally, the one of choice.

Case Report No. 6.—A black and white female Springer Spaniel (spayed) with acute canker of both ears. The ears were cleansed of all wax and debris, Cerbinol solution was thoroughly applied with swabs, and a few drops were placed in each ear. This treatment was continued for seven days, after which time the case was found clinically cured.

DISCUSSION

In the treatment of foot-rot in cattle and sheep, the use of an acid-ester preparation herein identified gave uniformly good results and is the best treatment, in our estimation, so far available to us.

In ringworm in cattle, the results were excellent. While certain cases were quite stubborn, nevertheless all treated animals responded.

In moist eczema in dogs, the use of Cerbinol proved of great value, all cases responding satisfactorily in a few days. In cases of dry eczema, although some improvement was observed, yet satisfactory end results were not obtained as consistently as in the moist form.

In cases of ear canker in dogs which are not of such long standing as to require surgical intervention, all animals treated were discharged as clinically cured within eight days.

In our experience thus far, we have observed no contraindications or untoward reactions during or following the use of this product on any animal.

ACKNOWLEGMENTS

We desire to acknowledge with appreciation the assistance of Dr. Howard C. Adams, Dr. Charles N. Belford, Dr. James C. Dewitt, and Dr. Fred Allen, either in treating or in checking on clinical results in some of the animals included in the series reported here.

Reactors to the tuberculin test have been reduced from 5 per cent of all cattle tested in 1918 to 0.24 per cent of all those tested during 1945.

Broad-brested turkeys weigh about 3 lb. more than bronze, but they eat 12 lb. more feed, so they maintain the usual average of 4 lb. fecd per pound of turkey marketed.

Sen and Minett (*Indian J. Vet. Sci. and Anim. Husb.*, (1944) report that *Musca domestica* and *Calliphor ergythrocephala* transferred anthrax from an ailing goat to a susceptible one by contact with cauterized skin. *Stomoxys calcitrans* failed to do so.

More Highlights

Sixty-Fourth Annual Meeting, Illinois State Veterinary Medical Association, Jan. 17-18, 1946

The agglutination test in swine is a means of determining the presence of infection in a herd, but it is not reliable when applied to single hogs. No satisfactory means of immunizing swine has been developed.—*Committee on Brucellosis of Swine.*

During the fiscal year ended June 30, 1945, the Illinois Department of Health found rabies present in 458 heads examined, and it issued 4,427 treatments for persons bitten or exposed to rabid animals.—*Committee on Rabies.*

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The Twenty-Third Annual Post-Graduate Conference for Veterinarians, Michigan State College, Jan. 22-25, 1946

Karo syrup is more effective than molasses in correcting hypoglycemia in cows. —*Dr. C. F. Huffman.*

Soil fertility must be maintained if civilization is to endure. History shows that a large population of healthy livestock is required to maintain fertility of the soil. —*Dr. B. T. Simms.*

In a community of 35,000 people, public health inspection can be maintained at a cost of about 12 cents per person per year. —*Dr. A. L. MacNabb.*

All phases of veterinary medicine are needed in public health work, and all veterinarians must eventually become interested and active in it.—*Dr. E. J. McLachlan.*

There is work to be done in public health, and unless the veterinarian engages in it, someone else will be trained and employed to do the work. We have more to offer along this line than we ourselves realize.—*Dr. M. D. Baum.*

NUTRITION

Recommended Nutrient Allowances for Dairy Cattle

[Excerpts from a report of the Committee on Animal Nutrition of the National Research Council, prepared by the Sub-Committee on Nutrition of Dairy Cattle consisting of J. K. Loosli, Chairman, C. F. Huffman, W. E. Petersen, and P. H. Phillips.]

TO ACHIEVE optimum efficiency in dairy production, it is essential to satisfy all of the nutritive requirements of the animals for growth, reproduction, and lactation.

The data available for the derivation of feeding standards are inadequate, but the values presented are the best estimates the Committee could make. These allowances are meant to be used as approximate guides for feeding dairy animals. They are not intended to represent the minimum requirements but furnish a safe margin above the true minimum.

NUTRITIVE REQUIREMENTS OF DAIRY ANIMALS

Digestible Protein.—It is the view of the Committee that, until more complete data are available, allowances of digestible protein recommended for dairymen should conform to present feeding standards and practice. For maintenance, the value of 0.6 lb. of digestible protein for 1,000 lb. of live weight was accepted, and an extra allowance for milk production of at least 125 per cent of the protein in the milk. It has been demonstrated that urea and other simple nitrogen compounds can be used by cows to replace a part of the protein in the ration.

Total Digestible Nutrients.—A limited energy supply more frequently retards the growth of dairy cattle and lowers milk production than does a deficiency of any other nutrient. In practice, the tendency is to waste protein and underestimate the energy requirement.

Minerals.—There is evidence that dairy cattle require calcium, phosphorus, magnesium, sulfur, potassium, sodium, chlorine, iodine, manganese, iron, copper, and cobalt. Zinc may be needed.

Calcium and Phosphorus.—From eighteen months to first calving, 10 to 21 Gm. of phosphorus daily are adequate, along with 6 to 12 Gm. of calcium daily. The ratio of calcium to phosphorus is important, 1:1 or 2:1 being more favorable than wider ratios. High-producing cows cannot assimilate sufficient calcium and phosphorus to meet their needs during early lactation, the extra minerals needed being taken from the reserves in the bones. For each pound of milk produced, 0.75 Gm. phosphorus should be allowed, along with 10 Gm. daily for maintenance of a 1,000-lb. cow. This provides almost double the amount of phosphorus in milk. On the same basis, it can be estimated that about 1.0 Gm. of calcium should be supplied per pound of milk.

Iodine.—In the goiter areas around the Great Lakes and westward to the Pacific, the use of iodized salt containing 0.015 per cent iodine incorporated at a 1.0 per cent level of the grain ration has corrected any deficiency of this element. The use of stabilized iodine is recommended.

Other Minerals.—Dairy calves require 0.6 mg. of magnesium daily per 100 lb. of body weight, when natural feeds are fed.

Iron and copper are necessary for hemoglobin formation, but requirements under farm conditions are not known. Deficiencies of iron, copper, and cobalt have been reported in certain areas.

Salt.—It has been shown that milk production is decreased by depriving cows of salt, but the specific amount needed cannot be stated. An allowance of 21 Gm. (0.75 oz.) is recommended for maintenance of a 1,000-lb. cow, plus an additional 9 Gm. for each 10 lb. of milk produced. The addition of 1 per cent salt to grain mixtures appears desirable, but, in addition, dairy animals should have free access to it.

Water.—Animals should have the opportunity to consume all the water they desire at frequent intervals. Milk cows need 4 to 5 lb. of water for each pound of milk produced. Depending on the size of the cow, the average daily intake will be 100 to 120 lb.

Vitamins.—Under favorable farm conditions, all of the vitamins are generally furnished by natural feeds, in adequate

A cow suffering from phosphorus deficiency and exhibiting depraved appetite (Gullickson et al., Minnesota Agric. Exper. Station).

amounts to meet the needs of dairy animals. Certain conditions require special supplements of vitamins A and D. Only rarely is there a need for special sources of any of the other vitamins.

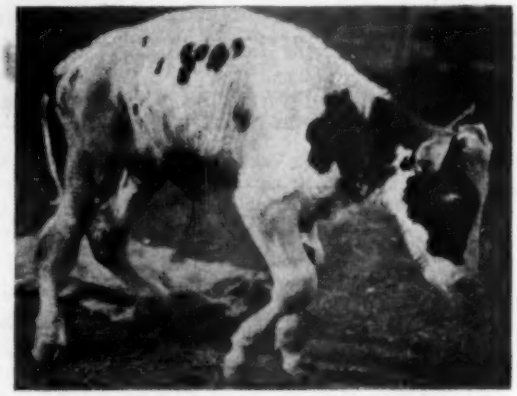
Carotene and Vitamin A.—Carotene allowances are suggested to meet the vitamin A requirements, because carotene is the precursor of vitamin A obtained from plant sources. Vitamin A, as such, is not now generally fed except to young calves. During the first few days after birth, young calves should receive colostrum as a source of vitamin A and other essential factors. During cold weather, 2.4 mg. of carotene per 100 lb. of body weight is adequate for Holstein-Friesian calves, and less can safely be fed in summer. After the first few months, growing cattle appear to need less carotene per pound of body weight than is required during the early weeks.

When good quality roughages are fed, the carotene intake will be appreciably higher than the minimum requirements. About 0.6 mg. of carotene per 100 lb. of weight are recommended in order to meet the needs. More carotene is needed for successful reproduction than for maintenance. Because of the extremely critical nature of the gestation period, it is recommended that at least 90 mg. of carotene per 100 lb. of body weight be fed to dairy animals during the last six to twelve weeks before parturition.

The vitamin A value of milk varies with the amount in the ration of the cow. During the pasture season it may rise to 2,500 I. U. per quart, whereas during winter feeding it may fall to one half or even one third of this amount.

Vitamin D.—Vitamin D is essential for maintenance, reproduction, and lactation of mature dairy animals. It is probable that under usual farm conditions adequate amounts are supplied by sun-cured roughages or direct action of sunlight.

Other Vitamins.—It has been shown that



This calf developed severe rickets while receiving a ration deficient in vitamin D, and without sunlight (Huffman et. al., Michigan Agric. Exper. Station).

several members of the vitamin B complex are synthesized by bacteria in the rumen of cattle, and that under most conditions adequate amounts of the B vitamins are furnished to dairy animals by a combination of natural feed stuffs and the synthetic action in the rumen. Until the rumen develops, calves probably require a dietary source of B vitamins—niacin, particularly.

SYMPTOMS OF NUTRITIONAL DEFICIENCIES IN DAIRY ANIMALS

Insufficient Energy Intake.—The symptoms vary with the degree of deficiency. Milk production drops. Growth of young animals is retarded or stopped. The coat tends to be rough, but desire for feed is good.

Protein Deficiency.—Little is known about the specific symptoms of protein deficiency. They are similar to those of insufficient energy intake. Affected animals

have a limited appetite for low protein diets.

Salt.—Deficiency of salt (NaCl) is manifested by intense craving for salt, lack of appetite, a haggard appearance, lusterless eyes, and rough coat. In milking cows, there is rapid loss of weight and milk flow; high-producing cows may collapse suddenly and die.

Calcium.—Long continued feeding of rations low in lime may result in fragile bones from depletion of their calcium and phosphorus. Milk production may decline.

Phosphorus.—The first evidence of phosphorus deficiency is a decline of blood plasma inorganic phosphorus to subnormal levels. Anorexia is the most reliable criterion of phosphorus deficiency, following a drop in plasma inorganic phosphorus. Depraved appetite, the chewing of bones, wood, hair, rags, etc. may be observed at any stage of the deficiency, but cows may suffer from extreme phosphorus deficiency without manifesting depraved appetite.

In chronic phosphorus deficiency, the animals may become stiff in the joints, and upon postmortem examination, the articular cartilages may appear eroded. Loss of appetite is the most pronounced symptom of phosphorus deficiency.

Magnesium.—Deficiency of magnesium has not been observed in cattle under farm conditions in this country.

Iron.—Iron deficiency studies have been complicated by the possibility of an accompanying cobalt deficiency, so that symptoms of simple iron deficiency in cattle cannot be stated. It can be assumed that it results in anemia.

Copper.—Deficiency of copper is manifested by unthriftiness, depraved appetite, anemia, and frequently by temporary sterility. Young animals show abnormal development, the pasterns are straight,

TABLE I—Recommended Nutrient Allowances for Dairy Cattle (Tentative)

Weight of Animal Lb.	Expected Gain		Daily Allowance per Animal[1]					
	Jersey Lb.	Holstein-Friesian Lb.	Digestible Protein Lb.	Total Digestible Nutrients Lb.	Ca Gm.	P Gm.	Carotene Mg.	Vitamin D I.U.
Growth:								
50	0.5	..	.30	1.0	4	3	[2]	150
100	1.0	0.8	.45	2.0	8	6	6	300
150	1.3	1.4	.60	3.0	12	8	10	450
200	1.4	1.6	.70	4.0	13	9	12	600
400	1.2	1.8	.80	6.5	14	11	25	1200
600	0.8	1.4	.85	8.5	15	12	35	....
800	1.1	1.2	.90	10.0	15	12	45	[3]
1000	..	1.3	.95	11.0	14	12	60	....
1200	..	1.2	1.00	12.0	12	12	70	....
Maintenance[4]								
700			.45	6.0	7	7	40	[3]
1000			.60	8.0	10	10	60	....
1200			.70	9.5	12	12	70	....
1400			.80	11.0	14	14	80	....
Pregnancy (per 1000 lb.) (Last 6 to 12 weeks)			1.2	14.0	22	17	90	[3]
Lactation (per lb. milk)								
3.0% fat			.040	.28	1	.7	[5]	[5]
4.0% fat			.045	.32	1	.7	..	....
5.0% fat			.050	.37	1	.7	..	....
6.0% fat			.055	.42	1	.7	..	....

[1] Thiamin, riboflavin, niacin, pyridoxine, pantothenic acid, and vitamin K are synthesized by bacteria in the rumen and it appears that adequate amounts of these vitamins are furnished by a combination of rumen synthesis and natural feedstuffs. Manganese, iron, copper, and cobalt are clearly essential but the amounts needed are not known. For growth 0.6 Gm. magnesium is needed per 100 lb. body weight.

[2] Calves should receive colostrum the first few days after birth, as a source of vitamin A and other essential factors.

[3] While vitamin D is known to be required the data are inadequate to warrant specific figures for older growing animals and for maintenance, reproduction, and lactation.

[4] When calculating the allowances for lactating heifers that are still growing, it is recommended that the figure for *growth* rather than *maintenance* be used.

[5] When adequate amounts of vitamins A and D are fed for normal reproduction, extra amounts will probably not stimulate milk production out will increase the vitamin content of the milk.

calves tend to stand up on their toes, and they develop "falling disease."

Cobalt.—When the ration contains insufficient cobalt, animals may show a gradual loss of appetite, progressive emaciation, rough coat, scaly skin, listlessness, retarded development of sexual characteristics, and anemia. In cows, milk flow and body weight fall. Diarrhea is often seen in cobalt-deficient calves. Appetite improves within two to five days after cobalt feeding is started. When 15 Gm. of cobalt sulfate is added to 100 lb. of salt, adequate amounts are available to correct the deficiency.

Iodine.—Cows deficient in iodine give birth to calves that have goiter. Feeding iodized salt during pregnancy prevents this.

Vitamin A.—The earliest sign of a vitamin A deficiency is a lowered vitamin A level in the blood. Deficient cows may be "shy breeders," while calves show watery eyes, cold in the head, nasal discharge, and sometimes a cough, scours, or pneumonia.

Night blindness is the first gross symptom easily detected, and may be followed by muscular incoördination, staggering gait, and convulsive seizures. There is epithelial metaplasia with transition from normal epithelial structures to stratified, keratinized epithelium in the mucosa of the respiratory tract, buccal cavity, salivary glands, eyes, lacrimal glands, intestinal tract, urethra, kidney, and vagina. Structures thus affected are very susceptible to infection.

Subclinical deficiency may be associated with the development of a roughened hair coat, general unthriftiness, emaciation, and dry pityriasis about the neck, withers, and top of back. In the pregnant animal, abortion or birth at term of dead or weak or blind calves may occur.

Vitamin D.—Rickets is conspicuously a disease affecting the growing calf, and one of the first symptoms is a decrease in the blood plasma calcium and/or inorganic phosphorus. Clinical symptoms begin with thickening and swelling of the metacarpal and metatarsal joints. The pasterns are straight and the back is humped. In advanced cases there is stiffness of gait, dragging of the hind feet, irritability, tetany, labored and fast breathing, anorexia (except for milk), weakness, and retarded growth. On autopsy, the gall bladder is frequently distended by accumulation of a viscous, ropey, orange-yellow bile. Enteritis is quite common.

Vitamin B Complex.—In the young calf, there is danger of a deficiency of certain B vitamins, although adult cattle obtain a sufficient supply from natural feeds and bacterial synthesis in the rumen. Deficiency of niacin in the young calf is manifested by diarrhea (sometimes bloody), dehydration, emaciation, and death.

HOW TO MEET THE RECOMMENDED ALLOWANCES

The recommended nutrient allowances can be met by feeding home-grown roughages or commercially available feeds. The amount of protein needed in the grain mixture for milking cows will vary with the kind of roughage fed. Home-grown grains or milling by-products may be used, or various combinations may be mixed to provide variety.

Cows will generally consume 2 to 3 lb. of hay daily for each 100 lb. of body weight. One pound of hay may be replaced by 3 lb. of silage, up to about 30 to 40 lb. daily. When this amount of roughage is fed, cows should be given 1 lb. of grain to each 3 or 4 lb. of milk produced, in order to satisfy the needs for energy and protein. Good quality hay and silage will generally supply adequate amounts of the vitamins required. Legume hays are rich in calcium, but extra supplements of this element may be needed when only timothy or grass hay is available. Phosphorus is usually furnished in adequate amounts by the grain mixtures commonly used.

Roughage, such as hay, silage, and pasture, is generally the cheapest source of energy and protein for dairy animals. These roughages also supply the vitamins and minerals, except possibly phosphorus, essential to sustain production. Because high quality roughages are liberally endowed with these nutritive factors, and poor hay may be very deficient, it is impossible to overemphasize the importance of an abundant supply of excellent roughages.

Prof. R. F. Miller, sheep specialist, University of California, at a recent meeting of wool growers, recommended molasses as a preventive of lambing paralysis. It is a supplement of feed that is always available.

Chronic Molybdenum Poisoning in Cattle

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SINCE 1869, a cattle disease characterized by intense diarrhea, emaciation, and change in coat color has been reported at intervals by ranchers on the southwestern edge of the San Joaquin Valley in central California. The area is devoted to oil, livestock, alfalfa, and cotton production. Dairy herds have been maintained from time to time, but at present none is known to exist in the area where the losses have been reported. Several of the large dairy interests in the Los Angeles area have at one time or another maintained heifers in the county, and at least one of these heifer herds had to be abandoned because of severe losses. During the past ten years, four different dairies are reported by the County Farm Advisor's office to have started and failed in the affected area because of this disease. The present paper will summarize investigational work conducted to date on the etiology of the problem.

SYMPTOMS AND MORBID ANATOMY

In the past, some confusion has arisen concerning the symptoms and postmortem findings in affected catttle because of the coexistence of anthrax, anaplasmosis, parasitic gastroenteritis, and the like. However, several uncomplicated cases have been observed. Affected cattle become emaciated; they show an intense liquid diarrhea full of gas bubbles, and the vulva becomes swollen. In coat color, Holstein-Friesians change from black to a mouse gray, Herefords to a rusty orange, and Guernseys to a muddy yellow. Anemia is usually marked. One affected heifer showed a cell volume of 16.9 per cent and a hemoglobin reading of 5.3 Gm. per 100 cc. Blood smears showed a hypochromic microcytic anemia with a high lymphocyte and platelet count. There is a pronounced jugular pulse on exertion, and weakness or stiffness is usually apparent. Death from prolonged purgation sometimes occurs. The average morbidity is about 80 per cent.

Young cattle are more susceptible than older ones, and dairy cattle more susceptible than beef. Sheep are but rarely affected, and horses and swine are reported to be resistant. The incubation period varies from one to seven months, depending on the location of the pasture. In typical outbreaks, all known infectious and parasitic diseases were eliminated by repeated laboratory examinations.

In one typical case killed at the height of the disease, a postmortem examination revealed the findings usually associated with anemia, weakness, and emaciation. The most striking was the appearance of a peculiar bluish cast to the peritoneum, the pleura, and all the abdominal as well as the thoracic viscera. The liver was slightly enlarged and swollen, and there was a mild gastroenteritis.

DESCRIPTION OF AFFECTED TERRITORY

The area involved in these losses is around Buena Vista Lake in Kern county and covers about 400 square miles. Much of the affected territory lies over the old bed of the Kern River which now flows farther north. In consequence, the land is undermined by decomposing tule growth and numerous water tables. In many places, water is reached as little as 3 to 5 ft. below the soil surface. The average rainfall, 5.9 in. a year, falls mostly in January, February, and March. Because of the low average precipitation, most of the cultivated land is irrigated with water from artesian wells or from canals off the Kern River. The soil is Merced silty clay loam and Merced clay loam. Alkali and salt deposits are abundant.

The observations of livestock men long established in the area are of interest. An old Spanish herdsman with forty-six years of experience stated that cattle, especially calves and heifers, feeding on overflow lands or on immature, rapidly growing forage, developed an intense diarrhea. He recalls that certain fields were safe while

The authors are from the Department of Veterinary Science (Britton) and the Department of Animal Husbandry (Goss), College of Agriculture, University of California, Davis.

others were not, even though the water supply in both fields was the same. According to his observations, certain strata of water 60 to 70 ft. deep appeared yellow or copper colored and always produced difficulty, whereas the artesian well water was harmless. Nearly all the local men interviewed agreed that well-cured hay and highland pastures were nontoxic to cattle, whereas insufficiently cured hay, or hay grown on seepage soil, caused acute diarrhea. Removing the animals from affected pastures or substituting grain hay or alfalfa hay grown in localities outside the involved lands produced recovery in three to four days.

A prominent dairyman in the area reported that the first frosts around November 15 bring an end to the trouble until the following late spring or early summer. In his opinion, the scum covering the irrigation ditches was the essential cause. According to an analysis by Dr. Lee Bonar, of the University of California, Department of Botany, this scum was composed of five genera of essentially harmless algae.

ETIOLOGY

According to laboratory examinations, symptoms, autopsy findings, and history, the etiological factor or factors concerned in this disease are contained in or on the herbage grown in the area. Preliminary analyses of reportedly toxic chopped alfalfa hay were conducted in 1939 by J. C. Martin, associate chemist in the Department of Plant Physiology, and were compared with nontoxic hay from a different portion of Kern county. The toxic hay showed a slightly higher content of ash, magnesium, and nitrate than the normal hay, but the difference was not considered significant.

In 1941, Muir[2] described a condition in Somerset, England, known locally as "teartness" and demonstrated that an excessive amount of molybdenum was the cause. Since the seasonal incidence, symptoms, history, and other phases of the disease observed on the teart pastures of Somerset appeared identical with the condition existing in Kern county, it was decided to investigate the possibility of molybdenum poisoning. In October, 1944, reports of an outbreak were promptly investigated. The trouble occurred among a herd of 700 yearling Holstein-Friesian and Guernsey heifers. These animals were brought to the ranch from Los Angeles in January and February, 1944, as weaners and were maintained on abundant irrigated alfalfa pastures at all times. By September 1, nearly 75 per cent were scouring, becoming emaciated, and showing the characteristic change in coat color, with vulvar swelling. All but 60 of the very worst cases were moved back to Los Angeles, were fed there on local hay, and recovered promptly. The remaining 60 cases were brought to the attention of the Division of Veterinary Science at Davis, on October 15. Alfalfa samples were collected and analyzed for their molybdenum content, and a typical case was brought to Davis for complete autopsy. Analysis of fecal samples and blood smears, and autopsy examinations eliminated parasitism, anaplasmosis, and other commonly encountered diseases. At Davis, local alfalfa was used as a control, and a 3-year-old Holstein-Friesian heifer, condemned for sterility, was killed for a comparison of the molybdenum content of various organs. Molybdenum was determined by an adaptation of the methods of Marmony[3] and Rogers[4] in which molybdenum thiocyanate is extracted with butyl acetate in place of ether, and the color density is measured photelometrically with the Evelyn photocolorimeter, using filter 440. Table 1 shows the results obtained. Several samples of bur clover from various parts of California, also analyzed, were found to contain 0.5 to 3.5 p.p.m. of molybdenum. In May, 1945, several alfalfa samples from the affected area were analyzed, with results of 6 to 36 p.p.m. of molybdenum reported.

TABLE 1—Comparative Analyses of Molybdenum Content of Toxic and Nontoxic Alfalfa and Affected and Normal Heifers

Specimens	Kern County p.p.m. Mo.	Davis (Normal) p.p.m. Mo.
Alfalfa	10.3	0.85
Hide	0.55	0.1
Lungs	1.13	1.3
Spleen	1.25	2.0
Bone	1.4	0.2
Liver	3.0	4.0
Intestinal contents	18.3	2.0

Ferguson,[1] and Muir,[2] reported that teart pastures contained more than 14 p.p.m. of molybdenum, whereas nonteart pastures never contain over six p.p.m. They classify pastures containing from seven to 14 p.p.m.

as potentially teart. They further show that the molybdenum content varies considerably in different seasons of the year and from field to field in affected areas. Judging from the analyses obtained from Kern county, the affected lands were at least on the borderline. The prolonged period of incubation would indicate that molybdenum acts as a cumulative poison, and that the total daily molybdenum intake was lower than that reported for the teart pastures of Somerset.

Support for the contention that molybdenum poisoning causes the diarrhea encountered in cattle pastured on the area involved was found in the striking similarity between this condition and the English disease. The species affected, symptoms, seasonal incidence, nontoxicity of cured hay from toxic lands, disappearance of symptoms after the first frost, marked toxicity of legumes as compared with grasses, increased incidence in the fall and on young, rapidly growing pastures, and similarity in soil type were all as noted by the English observers.

In December, 1944, 2 Holstein-Friesian heifer calves, 6 months old, and of equal weight and condition, were brought to Davis, were kept in a dry corral, and were fed hay and barley. One of them was given, besides this feed, 5 Gm. of sodium molybdate daily for seven months. During the first month, this heifer scoured considerably and lost weight. In six weeks, she was thin and rough coated, and her vulva was swollen about double the size of that of the control calf. At the end of two months, the hair around her eyes had turned gray, and in three months her entire head, neck, and back were gray. Despite a voracious appetite, she became increasingly emaciated, and at the end of the trial, she weighed 355 lb. in contrast to the control calf which was sleek and weighed 490 lb. A month after the molybdenum feeding was discontinued, the test calf was recovering rapidly, and the hair coat was again becoming black.

Except that there was no persistent diarrhea or marked anemia, this experiment apparently reproduced the disease seen in the affected area. The failure to cause severe diarrhea or anemia may possibly be explained by the well-known beneficial effects of giving dry feed to cattle on the pastures involved. Had this calf been fed on irrigated alfalfa pasture instead of a dry lot, the more typical picture might have developed. Undoubtedly there are many factors yet to be discovered before the problem is solved. A more thorough study is now being started with the coöperation of the divisions of Soils, Agronomy, Animal Husbandry, and Veterinary Science.

SUMMARY

Excessive amounts of molybdenum were found in the forage and in the viscera of affected cattle in a localized area of Kern County, California. Present knowledge of chronic molybdenum poisoning justifies the assumption that the disease observed in these young animals resulted from the ingestion of excessive amounts of molybdenum in the forage. A portion of the disease, as observed in the field, was reproduced by administering daily doses of sodium molybdate to a heifer calf.

References

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[2]Muir, W. R.: The Teart Pastures of Somerset. Vet. J., *97*, (1941): 387-400.

[3]Marmony, F. B.: The Determination of Molybdenum in Plant Material. J. Soc. Chem. Indust., *58*, (1939): 275-276.

[4]Rogers, L. H.: Comparison of Micro Methods for Determination of Molybdenum in Plants and Soils. Thesis, (1941): Cornell University.

Nutritional Deficiencies of Farm Animals on Natural Feeds

Speaking on this subject before the Ohio Annual Nutrition Conference, Dr. C. F. Huffman, Michigan State College, stressed the following points:

The greatest deficiency encountered is a lack of calories which may be due to crop failure, adverse climatic conditions, insect pests, or failure to adjust livestock numbers to the productivity of the land.

Many pastures are simply high class exercise lots, but a good pasture should enable a dairy cow to eat 100 to 150 lb. of grass daily.

Roughage is the basis of feeding for ruminants, and stortages in this item must be considered—notably, lack of an unknown milk-stimulating factor found in young grass but not in mature hay.

Mature forage crops are less digestible than the immature, as well as poorer in vitamin A.

Further Tests on a Fit-Producing Dog Food

AGNES FAY MORGAN, Ph.D., AND MARY GROODY, M.S.
Berkeley, California

RUNNING FITS, or canine hysteria, has recently been the subect of investigation in several laboratories. A commercial dog food, here designated FPF, was studied for several years in this laboratory and was found to produce fits consistently in dogs within five to nineteen days.[1] In 1 case at least, this condition was cured and prevented over long periods by the daily addition of 20 Gm. of raw casein to the diet. Wagner and Elvehjem[2] have reported an extensive study of the toxic effect in dogs of the addition of wheat gluten to normal diets. They were not able to prevent the fits with lysine, thiamin, pyridoxine, or casein supplements to gluten-rich diets and concluded that wheat gluten contains a substance toxic to dogs, though not toxic to the other species studied. They found that young animals were peculiarly susceptible to the reaction and that after the age of 7 or 8 months, dogs did not respond readily to the toxic stimulant. This is in accord with the general experience that growing dogs manifest deficiency and toxic syndromes more readily than do adult animals.

DOG-FEEDING TESTS

The commercial dog food, FPF, which had been tested in this laboratory was modified two or three times during our investigation without changing its fit-producing quality. Eventually, a third formula was adopted and marketed under a new name, here designated AB. This report concerns our experience with AB. The contents of these three foods are given in table 1. It will be noted that the chief change in the AB food is the introduction of fresh, ground beef lungs, meat scraps, and fish. The proportion of wheat flour was 63.2 per cent of the total, calculated on the basis of 13.0 per cent moisture. In the so-called vitamin supplements there were

TABLE I—Composition of FPF and AB Dog Foods

	1943 FPF (%)	1944 FPF (%)	1945 AB (%)
Wheat flour	68.0	58.7	63.2
Wheat germ	0.5	0.4	2.1
Bone meal and salt	1.3	1.3	2.4
Meat meal	15.7	18.9*	....
Soy bean	6.9	6.9*	17.0
Special vitamin supplements	7.6	11.3*	1.7
FPF meal	....	2.5	....
Ground fresh beef lungs	....	....	4.3†
Meat scraps	....	....	4.6†
Fresh ground fish	....	....	4.7†
	100.0	100.0	100.0
Heat treatment	Baked at 425F. for thirty minutes.	Baked at 300F. for thirty minutes, except items marked * which were added to the baked product without heating.	Baked at 425F. for thirty-five minutes.

†Calculated to 13.0 per cent moisture as were the flour and other ingredients.

This study was supported by a grant from the Nutrition Foundation Inc.

From the College of Agriculture, University of California, Davis.

some changes, but these appeared unlikely to be of importance. All of the formulas contained 20.0 to 24.0 per cent protein, and all contained 58.0 to 68.0 per cent wheat flour or 7.6 to 8.9 per cent wheat gluten.

A summary of the effects of these three foods upon 7 purebred Cocker Spaniels in our laboratory colony is given in table 2. All of these animals were of the same strain; 5 were from the same litter, and all were reared in the colony. If susceptibility to fits is a hereditary factor, as suggested by Berryman and Schlotthauer,[3] the tendency should be fairly distributed in these animals. No spontaneous fits have been observed in the colony except on certain experimental diets.

The same young dog, 440, which had been seriously and promptly attacked by the convulsive syndrome when fed the 1944

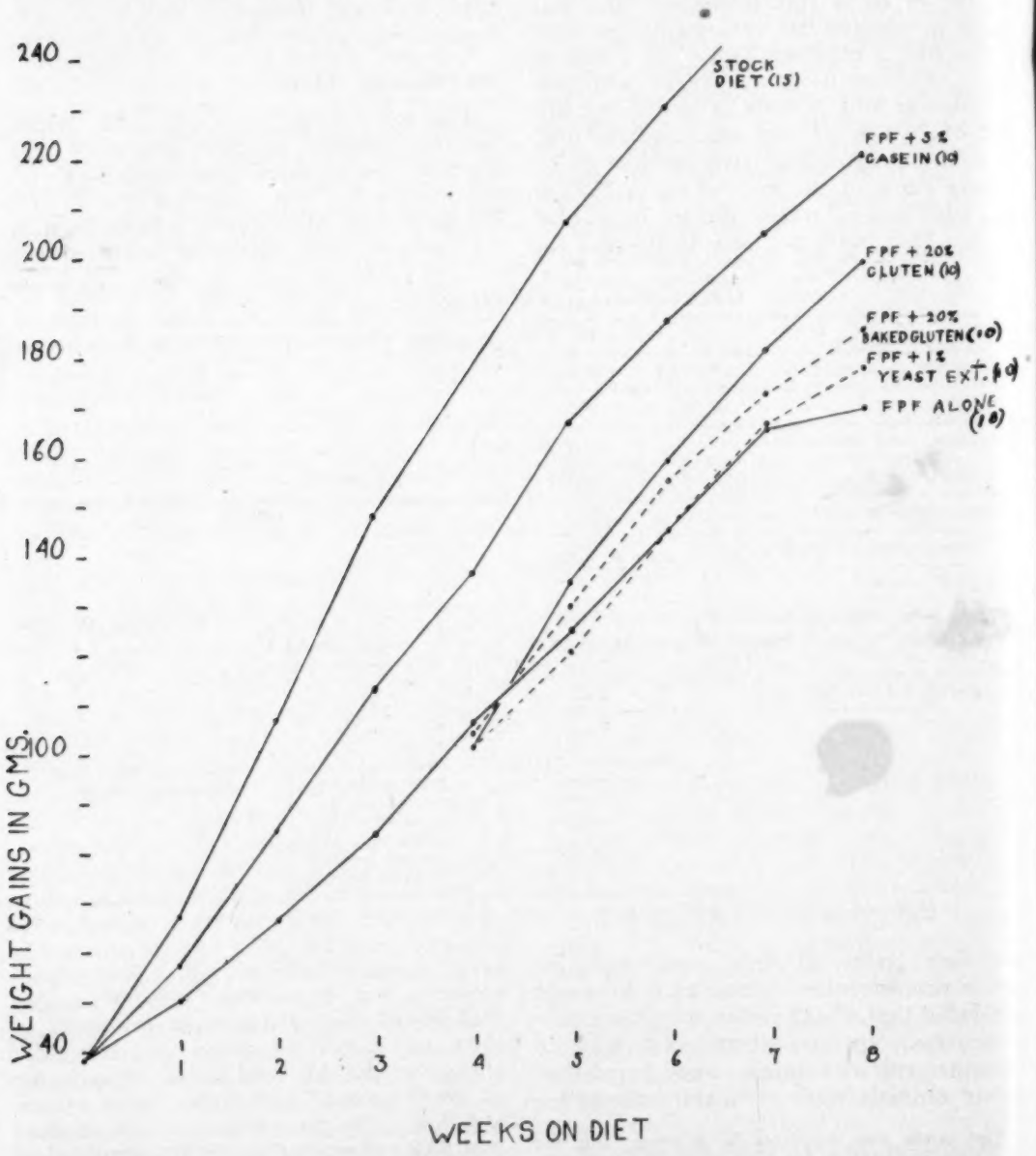

Fig. 1—Growth of young rats on stock diet and on dog food 1944 FPF, supplemented and unsupplemented. The figures in parentheses indicate the number of animals in each group.

FPF food at 15 months of age was placed on an exclusive diet of AB five months later. She was kept on this regime for seventy-eight days and remained in good condition the whole time, maintaining her weight, eating the food well, and showing no fits, nervousness, or any change in disposition. Her hemoglobin, red blood count, and serum protein dropped slightly, however, and the white blood-cell count rose somewhat as is shown in table 3. One month after she had been returned to the stock diet, her hemoglobin was normal, but the serum protein continued low.

In a still earlier test of FPF[1], dog 360 had likewise been observed to have lowered serum protein, 5.63 Gm. per 100 Gm. serum, and this was raised to 6.70 Gm. in three months when she was given a supplement of 5 Gm. of casein daily.

TABLE 2—Effects of Three Baked Dog Foods on Seven Cocker Spaniels

Dog and Sex	Age (mo.)	Weight Beginning (kg.)	Weight End (kg.)	First Attack Day	Days on Diet	Diet	Comment
367 ♀	45	9.5	8.5	*	19	1944 FPF	Extremely nervous.
372 ♀	45	7.7	7.2	7th	19	1944 FPF	Intermittent posterior paralysis on fifth day. When the first fit was observed, given 20% casein. No more fits seen.
440 ♀	15	8.2	7.4	5th	9	1944 FPF	Continuous fits by the ninth day. Stock diet on the tenth day.
251 ♂	79	14.6	13.1	19th	19	1944 FPF	Taken off FPF as soon as first fit was seen.
373 ♀	45	10.1	9.2	10th	10	1943 FPF	Taken off FPF as soon as first fit was seen.
375 ♀	45	8.4	8.1	13th	13	1943 FPF	Taken off FPF as soon as first fit was seen.
366 ♀	45	9.1	8.2	*	19	1943 FPF	Extremely nervous, intermittent crippling of hind quarters.
440 ♀	20	9.4	9.5	*	78	AB	Excellent appetite and general condition.

*None observed.

RAT-FEEDING TESTS

Growth tests with young rats were made on these dog foods. The foods were supplemented in all cases by 0.2 Gm. of grayfish oil (12,000 I.U. vitamin A per Gm.) per rat, per week. Sixty weanling rats were used for a comparison of the rat stock diet* with the 1944 FPF, alone and supplemented with 5.0 per cent washed casein, 20.0 per cent raw wheat gluten, 20.0 per cent baked wheat gluten†, and 1.0 per cent yeast extract.‡ As shown in figure 1, the rats grew fairly well on the FPF plus 5.0 per cent casein and somewhat better on the gluten-supplemented diets, but no better on yeast-extract supplements than on the FPF alone. None of the FPF-fed groups, however, approached the performance of the rats fed the stock diet. It had been assumed that if an excess of wheat gluten in the FPF depressed the growth value of the diet, the addition of raw gluten and, more especially, baked gluten might still further decrease its value. Obviously, this was not the case. Also, there was apparently no lack of water-soluble vitamins in the food, since the yeast extract did not improve its growth value. According to Wagner and Elvehjem[2] and our own experience, rats are not subject to the convulsive seizures produced in dogs by this type of diet, but it seemed possible that

*The rat stock diet contained whole wheat, 45 per cent; casein, 18 per cent; skimmilk powder, 18 per cent; dehydrated alfalfa, 6 per cent; wheat germ, 5 per cent; yeast, 2 per cent; $CaCo_3$, 1 per cent; NaCl, 1 per cent; and corn oil, 4 per cent, containing 0.2 Gm. grayfish oil providing 2,400 I.U vitamin A.

†The gluten was baked thirty minutes at 325F. in thin layers, with frequent stirring.

‡Liquid yeast extract 3, Biological Laboratory, No. 2803, supplied by Anheuser-Busch Co., St. Louis, Mo.

the decrease of growth rate noted in this species on these baked dog foods might be an expression of the same dietary fault.

The new food, AB, was next similarly compared with the stock diet and 1944 FPF,

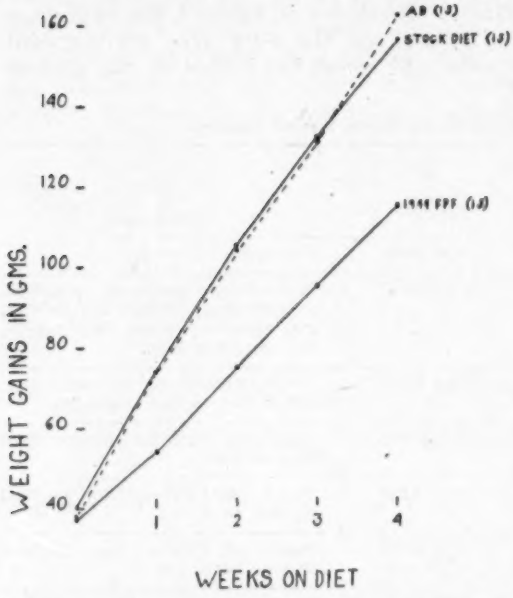

Fig. 2—Growth of young rats on stock diet, 1944 FPF, and AB dog foods. The figures in parentheses indicate the number of animals in each group.

with another group of 45 rats, as is shown in figure 2. In this case, the growth of rats on AB and the stock diet was precisely the same. The difference in performance on AB and FPF could not be attributed to any change in the wheat gluten content or to total protein content, since these were nearly the same in the two foods.

The improvement in rat growth value of the formula of FPF by the addition of about 13.6 per cent fresh animal protein without reduction in wheat flour content indicated that the food had had less than optimum quantitative protein value. The maintenance of dog 440 for seventy-eight days on the improved food, without fits or weight loss or other change except gradual slight fall in blood proteins, indicated that the wheat content of the food did not alone produce the toxic effect. The food apparently still was not optimum as to protein content for this dog.

SUMMARY

1) A baked cereal dog food, here designated FPF, previously found to cause severe running fits in dogs within five to nineteen days, was found by rat growth to be deficient in protein, since its growth value was improved by the addition of 5.0 per cent casein, 20.0 per cent wheat gluten, or 20.0 per cent baked wheat gluten, but not by the addition of 1.0 per cent yeast extract of high vitamin content.

2) A new baked food, here designated AB, produced by the manufacturer of FPF and similarly tested, was found to be equal to the stock diet for the growth of young rats. A young Cocker Spaniel bitch which had suffered an extremely severe reaction from the previous food was maintained in good condition on the new formula, with no fits for seventy-eight days.

TABLE 3—Blood Changes in Dog 440 Fed Diet AB

				Cell Count				Serum Proteins		
Diet	Date	Hb (%)	Hematocrit Per Cent Cells	RBC Millions per cc.	WBC Thousands per cc.	Glucose (mg.%)	Chlorides (mg. %)	Total (%)	Albumin (%)	Globulin (%)
Dog Stock Diet	Feb. 7	16.7	46.7	7.75	6.05	77	468	6.75	4.93	1.82
A B	Feb. 8	...	...	...	...	..	...	...	...	...
A B	April 17	17.4	51.5	8.20	12.95	82	474	6.50	4.50	2.00
A B	May 18	16.0	46.1	7.55	11.25	75	...	6.72	4.76	1.96
A B	June 6	...	45.0	6.95	10.85	92	510	6.14	4.08	2.06
A B	June 15	15.2	...	6.65	14.70	..	...	...	...	...
Dog Stock Diet	June 16	...	...	...	...	..	...	...	...	...
	July 18	16.9	57.6	7.85	13.00	75	474	5.84	4.00	1.84

3) The main difference between FPF and AB formulas lay in the incorporation in the latter of fresh, ground beef lungs, meat scraps, and ground, fresh fish, previous to the baking. There was no reduction in the proportion of wheat flour in the formula.

References

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[2]Wagner, J. R., and Elvehjem, C. A.: A Study of Canine Hysteria Produced by Feeding Certain Baked Dog Foods and Wheat Gluten Flour. J. Nutr., *28*, (1944) :431-441.

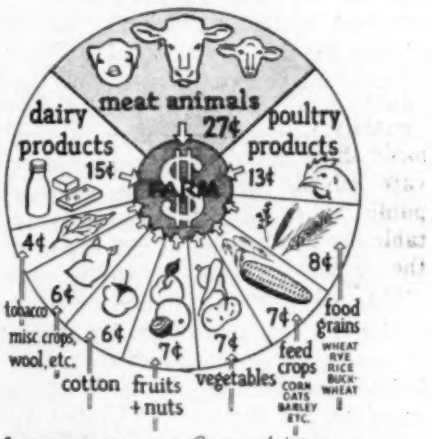
[3]Berryman, G., and Schlotthauer, C. F.: Is Fright Disease an Avitaminosis? North Am. Vet., *22*, (1941) :34-38.

Purity Versus Nutritive Quality of Food

Though primarily concerned over the purity of food and truthful labeling, the Council on Foods and Nutrition of the American Medical Association is now giving particular attention to nutritive quality in order to fulfill its purpose. Standards of nutrition are now paramount. Foods have suffered deterioration of nutritive value through processing them in such a way as to deplete the essential ingredients—vitamins and minerals. Valuable parts are discarded in favor of inferior parts and high temperatures used in preparation may further reduce their food value. Chemically pure sugar contains but a trace of its original vitamins and minerals; white flour from which the nutritive germ and outer casing have been removed and refined cereals are not adequate substitutes for the whole cereal grains which once furnished the B vitamins and mineral elements essential to good nourishment. So, inasmuch as the public prefers processed foods, there are reasons to be gravely concerned over the long-range effect on public health. The danger is greater because the ill effects of deficient diets become obvious only after many years, or when remedial measures are futile. The Council has supported the programs of the dairy industry to produce milk of a higher and more uniform vitamin A content; plans are being laid to issue the Council Seal to canned goods (tomatoes and fruits) containing high vitamin C values, and to encourage the addition of certain nutrients to selected foods. Among the foods set apart to be enriched are: processed cereals, corn meal, hulled rice, white flour, milk, and margarine, each with specified vitamin fractions and mineral elements which they lack. The intention is to give true scientific meaning to "enrichment."—*Condensed from Nutrition Reviews, November, 1945.*

The most apparent change in the science of nutrition, brought about by the discovery of vitamins and their dynamics, is the demotion of the old chemical analyses of foodstuffs.

A cow grazing on good pasture will consume 100 to 150 lb. of grass daily, and chew some 41,000 times. Don't ask us who counted!



More than one-fourth of American farmer's total cash income in 1945 came from the sale of meat animals, according to the American Meat Institute. Meat packers paid out approximately 5 billion dollars to five million farmers and ranchers. This was approximately 150% greater than the average of the pre-war years of 1935-1939. From their total cash income, livestock producers paid out large amounts for stock, feed, help and increased operating costs.

EDITORIAL

The Veterinary Medical Field

As early as 1879, with the aid of General George B. McClellan, who had studied the military veterinary service of the Crimean War, the AVMA (USVMA) succeeded in having the War Department (through an act of Congress) specify veterinary college education as a qualification for veterinarians of the cavalry arm. It was then that the seed for the Army Veterinary Corps established by Congress in 1920 was planted. In creating the U. S. Bureau of Animal Industry in 1884, Congress specified that its chief should be a veterinary college graduate and the Civil Service Commission ruled likewise for most of its personnel. Through the years that followed (mostly in the 1890's), licensure laws set aside veterinary practice for the college graduate in the principal states. Teachers of veterinary science in the agricultural colleges, state veterinarians and assistants, and the animal pathologists of the industries were customarily drawn from college alumni. The basic chain was forged by graduates of private schools or of foreign schools before public veterinary education was given notable encouragement in this country. It is the chain that now keeps the practice of veterinary medicine among the learned professions. Yet, up to this day, the question of graduate or nongraduate remains too delicate to handle on the organizational agendum, not alone in the United States but also in other important countries, because, let us confess, veterinarians in the line of duty have to meddle occasionally where they are not invited. Not long ago, the Englishman going to Paris took along his bottle of milk. The milk of Paris had a bad reputation. The late Professor Porcher, honorary member of the AVMA, told this writer at Alfort in 1919 that his lessons (lectures) on safe milk were "blue penciled" by the French Minister of Agriculture. The free-for-all use of live viruses is an unsettled question in this country and woe to the job of the public official who openly protests. The use of strain 19 vaccine against bovine brucellosis is now running the gauntlet of lay use as did tuberculin. A few noncollege men still practice and prosecutions for violations of the practice laws are not famously numerous. But, possibly, worse is to come. As the field of food hygiene looms big in the public mind, political inspectors in considerable numbers vouch for purity and nutritive value of food without noteworthy protests.

The failure to provide scientists for the upper brackets of veterinary medicine is commonly pointed out, as is the failure to provide courses in zoötechnics. Training in this science would bring animal production into the veterinarian's realm. At present, the knowledge we take to the barnyard concerning the management of the animals we meet there is extra-curricular information.

The nongraduate question is neither narrow nor prosaic. It is tremendously broad and poetic—worthy of study. We must consider that veterinary medicine has scientific and economic entanglements not contained in the sphere of human medicine which we feign to imitate. In fact, veterinary medicine is more or less deeply rooted into everything man does. The need now is to provide capable personnel for every branch and niche.

From the manifestly incompetent licentiate of necessity and loose laws to the highest estate of scientific research are many mansions not occupied by veterinary college graduates. Within the length of that range resides "The Field of Veterinary Medicine"—in other words, the graduate-nongraduate issue. It is a fundamental study—a first principle in personal classification—that ought to be faced squarely and fairly with public welfare uppermost in mind and certainly without high-hatting the nonveterinary technician necessity has created, precisely as necessity created self-

educated practitioners before there were veterinary colleges. The issue is vague and distasteful—vague because it was never given the dignity of consistent consideration and distasteful because it has the tang of selfishness.

Frankly, "The Veterinary Medical Field" is just another label for the nongraduate issue. Certainly, no issue could have greater influence on the place veterinary medicine will occupy in the future world. Created by the founding of veterinary colleges, it expanded far beyond the original concept of its scope, *i.e.*, beyond clinical work. The point is that the field of veterinary medicine expanded faster than the number of its personnel, with the result that self-trained men step in to fill the gaps and thereafter defend their *right of eminent domain.* We cannot expound the doctrine of "veterinary service for the graduate veterinarian" until we draw a map of veterinary service that meets with public approval. To conquer and take possession of the field we call our own, we must face the hard fact that necessity is a good provider. Where *we* do not step in *Necessity* will. The livestock of our 30,000,000 people before there were veterinary colleges, and of some 75,000,000 before there was a corporal's guard of competent graduates, are not figments of the imagination. "He who does not heed history, repeats it," is an old axiom. Which are we doing?

Corrigenda

The editorial, "Pullorum Disease: Historical Sketch," in the January JOURNAL (p. 51) contained errors in referring to the pioneer work of Professor Leo F. Rettger on this disease, which have been called to our attention by several correspondents.

The editorial stated that "Pullorum disease was first described as a given disease by Rettger, *of Germany, in 1889.*" Professor Rettger, as practically everyone knows, did his early work on this disease at Indiana University and isolated the causative agent in 1899, which he later named *Bacterium pullorum* (now classified and recognized as *Salmonella pullorum*). Professor Rettger is a native of Indiana, well known for his many years in charge of animal disease investigations at Storrs Agricultural Experiment Station, and is now emeritus professor of bacteriology at Yale University. His only connection with Germany was as a student at Strassburg in 1903, when he was a research scholar of the Rockefeller Institute.

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In discussing developments in "Poultry Medicine" (p. 52), reference was made to the work of Pasteur on fowl cholera in *1868.* The date should have been 1880, in which year Pasteur succeeded in growing pure cultures of the organism which established fowl cholera as a disease entity. The discovery led later to his classic experiments on bacterial attenuation and the use of attenuated cultures as immunizing agents.

"No Treasury Raid Here"

Under the above head, the *Chicago Daily Drovers Journal* for January 16, 1946, had the following to say, editorially, about the campaign now being conducted among veterinarians:

Very interesting is the report that a fund of $100,000 is to be raised by members of the veterinary profession to support and promote research studies. The American Veterinary Medical Association, sponsoring the undertaking, states that the fund will be used in two ways—to advance knowledge in both basic and applied aspects of veterinary science, and to assist in training promising young scientists in these fields, through fellowships for graduate education. Every veterinarian in America will be asked to participate in the fund. After the initial $100,000 has been provided by members of the profession, contributions will also be solicited from animal lovers, livestock owners, and commercial concerns.

Both important and commendable. Every livestock producer will applaud the project for it is realized that there are more baffling livestock ills than ever before. A sure-fire preventive or cure for one of the modern swine diseases, for instance, could be worth millions to the hog industry every year. And what a unique and creditable thing it is that these folks are setting out to raise the fund out of their own pockets without running to Washington for it. It sets a pattern that points the way to self-respect in professions and industries. The vets refuse to be mendicants.

Charles E. Snyder, able and outspoken editor of the *Drovers Journal,* has been for many years a strong advocate of more and better veterinary service as an economic

must for livestock producers. His words are timely and give added stimulus to the campaign, which has already received news coverage in papers from coast to coast.

The Niche of the D.V.M.

Only continuous work on public relations, well-founded and well-planned, can map out the ground which the D.V.M. should occupy and cultivate as his own. Generating knowledge and skill to justify that end is not the obligation. Methods of application acceptable to the people must also be generated, by custom or law, in order to secure a permanent place for the graduates of veterinary colleges. Graduating veterinarians after five or more years of intensive study and throwing them into an undefined field has always ranged among the baffling problems of each period for the reason that veterinary science has advanced faster than popular understanding of its proper application. The graduate-nongraduate issue, which once waxed warm only in clinical work, crops up in every field that veterinary science creates. The complex task of circumscribing a definite sphere for the graduates of veterinary colleges has been difficult and slow, ever since the first veterinary college was founded.

The rate of progress in that connection has followed closely the development of organized veterinary medicine, the people's source of information. Now that organization has been more generally embraced as one of the necessities of professional life, more rapid progress in marking out the exact place the veterinarian should fill in the world's work may be expected. Never, since the founding of the first veterinary college in this country, were prospects brighter for the D.V.M. The scope of veterinary medicine has now taken tangible form. With veterinary colleges of the conventional order established in the principal regions of the country—East, Middlewest, South, West—the security of veterinary medicine is assured. These institutions are expressions of public interest in veterinary science and the veterinarian himself. Except that there was a broad and undeveloped field to pitch in and explore, the veterinary college graduate of the past could never be sure where, and to what, his education would lead. If the situation is not yet completely clear, there is now machinery—colleges and organization—set up to perfect it.

Italy has more than 4,000 graduate veterinarians from its ten schools, but under its plan of socialized medicine they are not rendering an adequate veterinary service, says Lt. Col. R. W. Rushmore. The system is inefficient and unsatisfactory to the veterinarian as well as to the livestock owner. Italy is one third larger than Iowa, which has 800 veterinarians.

The Founding of Veterinary Colleges in the New World

The time at which our veterinary educational system was started is *undisputable* because it is a matter of record, and it is *undisputed* because, up to date, the subject has not been a matter of general interest, important as such facts are in critical history.

We have, for example, permitted world veterinary historians to fix 1875 as the year when dogmatic veterinary education was founded in the United States—and nobody has ever registered a protest against the outstanding historical blunder. The error ought to be corrected now in the interest of this generation's I.Q. Too, our ambitious successors of coming generations may construe our indifference as stupidity.

The year 1875 is the time when Alexandre Liautard and other teachers broke away from the New York College of Veterinary Surgeons, founded in 1857, and started the American Veterinary College. The schedule of founding legally authorized veterinary faculties in America is as follows:

Philadelphia Veterinary College, 1852.
University of Mexico, Veterinary Department, 1854.
Boston Veterinary Institute, 1854.
Toronto Veterinary College,* 1862.
Montreal Veterinary College, 1866

Philadelphia is the *Lyon* of the United States, Mexico City, D. F., the *Lyon* of the Republic of Mexico, and Toronto is the *Lyon* of the Dominion of Canada. These are the undisputable facts of record, undisputed and unread, because the saga of our institutional veterinary education has yet to arouse general attention.

*Renamed Ontario Veterinary College, which holds the longevity record for veterinary colleges of the New World.

CURRENT LITERATURE

ABSTRACTS

Effect of Cold on Parasite Eggs

The pre-infective stages of Oesophagostomum, Cooperia, and Trichostrongylus were killed when subjected to maximum temperatures for fourteen days below 42 F., and to minimum temperatures below 29 F. Some eggs developed into infective larvae during exposure as follows: Ostertagia when exposed to mean maximum temperatures of 57 F.; Trichostrongylus when exposed to 61 F., and Cooperia and Oesophagostomum during exposure to 65 F.

The pre-infective stages of Cooperia, Trichostrongylus, and Oesophagostomum exposed on pastures to climatic conditions similar to those of Beltsville, Md., probably would be killed during the months of December, January, and February, while those of Ostertagia would be killed only by sustained temperatures below freezing. Also the eggs of Ostertagia would survive and begin to develop at lower temperatures than the eggs of three other parasites.—[*A. G. Dinaburg: The Effect of Low Outdoor Temperatures on the Free-Living Stages of Some Common Nematode Parasites of Sheep. Am. J. Vet. Res., 6, (Oct., 1945): 257-263.*]

Veterinary Work in Shanghai

The author describes the veterinary situation at the International Settlement of Shanghai before the war—that is, at the time of the Japanese invasion of China, when the medical register showed there were 32 veterinarians in the Settlement: 3 Britons, 11 Chinese, 1 Dane, 5 Germans, 4 Japanese, 1 Norwegian, and 7 Russians, in a population of 3,500,000 consisting of over 50 nationalities. The veterinarians were mostly private practitioners. There were large adjacent dairy farms which distributed their own milk. An American farm had 300 cows. As the Chinese cows were not of dairy breeds, most of the cows were imported from Canada, the United States, New Zealand, Australia, Russia, and Japan. There being no pasture, the cows were stabled the year around. Milk was delivered in sealed bottles. Except for mare's, buffalo's, and goat's milk, pasteurization was compulsory. The animal diseases were tuberculosis, foot-and-mouth disease, rinderpest, rabies, anaplasmosis, anthrax, hog cholera, erysipelas, contagious pleuropneumonia, and some brucellosis, particularly among Japanese cattle. Antemortem and postmortem meat inspections were carried out and plans were on foot to inspect all poultry at the time of slaughter. The municipal slaughterhouse, kept very clean, was an imposing structure mistaken for a beautiful temple by tourists coming up the river. There was also a section for kosher slaughtering. The veterinarians supervised the production of vaccines and serums for human use—over a million doses a year—and also animal products (feathers, down, casings) for export. There is not much danger of exotic disease being brought out of China, for once an animal enters that country it is never exported.—[*J. J. Carney. Provincial Board of Health (B.C.). Canad, J. Comp. Med.*, 9, (*Dec.*, 1945): 338-340.]

Leucemia in Cattle

In spite of reported failures to transmit cattle leucemia, the authors believe that it is reasonable to expect successful transmission of the disease, as has been done in the case of mice, rats, guinea pigs, and fowl. They point out that, in the latter species, it is necessary to use a large number of animals for the primary transmission, which is not economically possible in the case of cattle and also that the genetic constitution of the donor and recipient must be similar. The fact that these two conditions have not been complied with may be responsible for the failures of transmission reported in the literature.

Each of 5 calves, 10 to 12 days of age, were inoculated intravenously with 400 to 500 cc. of blood from a bull with lymphatic leucemia. One of the calves was a son of the donor animal. In six weeks, a lymphocytosis—20 to 80 per cent of about 10,000 leucocytes—developed in 4 of the calves. In a year, they showed anemia and lymphocytosis—64 to 95 per cent of 23,000 to 43,000 white cells—but after three years the blood picture was normal. The rôle of nutrition and other factors in altering the normal blood picture of the animals was not known. No evidence of lymphatic leucemia was observed during three years of observation. The animals appeared healthy and the 3 females had normal pregnancies.

In another experiment, a 16-day old calf was given 1,000 cc. of blood from its sire which had lymphatic leucemia. No alterations of the normal blood picture were observed for the subsequent twenty months.—[*J. Engelbreth-Holm and N. Plum: Experiments into Homologous Transmission of Leucemia in Cattle (in English). Skand. Vet.-tdskr.* 31, (*Dec.*, 1941): 705-713.]

ALFRED G. KARLSON

Tuberculosis Discovered in Meat Inspection

The newer regulations on the control of bovine tuberculosis in Sweden require that, when the disease is found on meat inspection, the local board of health or the tuberculosis control division of agricultural societies be notified. This procedure will be an important adjunct to the other methods employed for finding tuberculosis in cattle and will assist in disclosing cases where the herd is supposed to be free of the disease, as determined solely by tuberculin testing. The author describes two instances where tuberculosis was demonstrated on meat inspection in animals from supposedly healthy herds. A herd of 22 cattle was tested in April, 1941, and reported to be free of tuberculosis. In September, 2 cows were slaughtered and on inspection were found to have pulmonary tuberculosis of such marked degree that it must have been present before the April test. When this was reported the herd was again tested. All the older cattle and half the young stock reacted. From another herd of 10 animals that were tested and declared healthy in April, 1941, a calf slaughtered in July was found to have tuberculous lesions of the portal lymph nodes. When the herd was retested, all the cattle reacted and at least 1 cow had positive symptoms.

If the disease had not been discovered at meat inspection, these herds would have been considered tuberculosis-free till the next period test in 1943.—[*S. Jerlov: The Compulsory Notification of Tuberculosis Discovered by Meat Inspection. Skand. Vet.-tdskr.* 31, (*Dec.*, 1941): 732-738.]

ALFRED G. KARLSON

Sulfanilamide in Large Animals

The author found that in order to obtain effective blood concentrations of sulfanilamide for horses, it was necessary to give an initial dose of 0.10 Gm. per kilogram (2.2 lb.) of body weight per os, followed by one third that amount every eight hours. In this dosage, the drug is dissolved in water. If given as the powder, the above dose is increased by one third. For cattle, the optimum dose in powder form is 0.15 Gm. per kilogram of body weight initially, followed by half this amount every twelve hours. In acute infections, half of the dose should be given intravenously and the other half per os. This form of treatment should be continued for several days to a week after the acute symptoms subside.—[*Ingemar Alstrom: The Dose of Sulfanilamide in Large Animals. Skandinavisk Veterinar-Tidskrift*, 32, (*Feb.*, 1942): 105-117.]

ALFRED G. KARLSON

Intestinal Torsion in Swine

Torsion of the intestine in swine is more common than reports in the literature would indicate. Of 2,500 swine examined in a federal laboratory, 28 or 0.9 per cent showed displacement of some portion of the bowel. Seventeen of these showed torsion, seven had invagination of the ileum into the colon and four had hernias. Of the 17 cases with torsion, 9 involved the small intestine alone, 6 had combined volvulus of the colon and small intestine, and in 2 cases the colon alone was affected. As in the horse, the posterior portion of the small intestine is usually involved but in 2 cases almost the entire length was affected. The twisted gut is red and is distended with gas and hemorrhagic contents. The mucosa is hyperemic and the wall is thickened by submucosal edema. There is subserous hemorrhage and sanguineous transudate in the peritoneal cavity. There is also stasis in the mesenteric vessels and distention of the stomach. The colon turns on its long axis, twisting at the base of the spiral. In cases where both small intestine and colon are involved, it is possible that it was primarily volvulus of the colon with secondary involvement of the small intestine. Volvulus of the intestine is readily diagnosed at necropsy except when the volvulus has been corrected agonally or *postmortem*. If the necropsy is not carefully done, the volvulus may be accidentally replaced to its normal position and missed entirely. In cases where stasis of the bowel is apparent on exposing the abdominal viscera, one should carefully examine the mesentery and base of the colon to see if there has been any displacement before removing the intestine. The branches of the anterior mesenteric artery and vein are such that volvulus of one portion of the intestinal tract may cause stasis in other portions that are not involved in the torsion. Torsion of the intestine in swine may be caused by impaction and the resulting tympany.—[*I. Nordlund: Intestinal Torsion in Swine. Skand. Vet.-tdskr.* 32, (*Jan.*, 1942): 24-28.]

ALFRED G. KARLSON

Salmonella Infection in Swine

In a study of 227 swine, presented for autopsy and diagnosis, approximately 55 per cent showed gross inflammatory lesions of the lower intestinal tract. Salmonella organisms were isolated from 30 (13%) of the total, and from 21 (17%) of those showing intestinal lesions. Other types of organisms were isolated from 153 swine in this group, but 65 (29%) of the total number failed to yield any enteric organisms in the five common groups of pathogens. Of these 65, there were 25 (38%) which showed gross lesions of the lower digestive tract.

Of 194 strains of Salmonella organisms isolated from swine, 134 (69%) were *Salmonella choleraesuis*, var. *kunzendorf*. The remaining 60 isolations were scattered among 14 Salmonella sp.

From 110 blood samples tested for H antigen agglutination, it was concluded that this is not a reliable method for finding the infected animals.—[*N. D. Levine, E. H. Peterson, Robert Graham: Studies on Swine Enteritis II. Salmonella and Other Enteric Organisms Isolated From Diseased and Normal Swine. Am. J. Vet. Res., 6, (Oct., 1945): 242-246.*]

ACS = Antireticular Cytotoxic Serum

The long sought cure for premature old age appears to have been discovered, at least in part, when Professor Alexander A. Bogomolet and 60 coscientists of the U.S.S.R. perfected a serum from the reticulo-endothelial system of human bodies dead but a few hours. The study leading to the discovery of the life-prolonging serum was made among the supercentenarians of Abkhasia on the Black Sea, the alleged Biblical region where Methuselah lived to the age of ten centuries, and where now a colony of persons lives twice as long as the Scriptural three score and ten. In this strange land, these scientists found for their studies 35 persons, brisk and lively, at ages between 113 and 136 years. The announcement of the wonder serum was published in the December, 1945, *Ladies, Home Journal*, and was condensed for *Reader's Digest* for February, 1946, by William L. Lawrence, Pulitzer Prize winner for distinguished reporting.

ACS is the result of thirty years of continuous study of the functions of connective tissue, long known as the chief cause of ageing—that is, the crowding of the vital cells by this supposedly passive framework which now takes its place among the most vital body tissues. The connective tissue cell, vital as Metchnikoff found it to be long ago, has been bypassed as of little concern in the study of pathology. The pathologist of the last fifty or more years saw nothing in the phagocyte of formative tissue but what its name indicates—an eater of germs—and there the connective tissue cell remained until the remarkable function of the reticulo-endothelial system was demonstrated and shed new light on the army of body defenses. The new Russian discovery of a still larger rôle of the body framework is, therefore, not fantastic. Extending the span of life to 150 years or even to the ten centuries attained by Biblical figures is not beyond the range of scientific probability. All there's to do is to rejuvenate the connective tissue with antiserum or, better still, prevent the cytotoxicosis of the ageing body as the supercentenarians appear to do. This the Russian scientists seem to have accomplished in part. There is but to remember that the process of ageing is but one of the degenerative processes responsible for many chronic diseases. In other words, ageing is a chronic disease which, along with other chronic diseases, is not as incurable as it may have seemed. The old Caucasians reach their age because some unknown agency or agencies keep their connective tissues young, and the majority of mankind age prematurely in the absence thereof.—[*William L. Lawrence: Tomorrow You May Be Younger. Reader's Digest, 48, (Feb., 1946): 1-4.*]

BOOKS AND REPORTS

Lander's Veterinary Toxicology

The third edition of Lander's toxicology follows the patterns of 1912 and 1926, without salient omission of the subjects involved. The book shows a diligent search for the new facts which have come to light since the last edition was published, British investigational work predominating. In so far as the common mineral elements, drugs and chemicals, and the injurious plants are concerned, livestock toxicology has been a fixed and quite complete study for a long while, but without the present knowledge of such toxic agents as selenium, fluorine, nitrates, phenothiazine, cyanogenic plants and products, and spoiled sweet clover, the known facts of twenty years ago would be manifestly deficient at this hour. As far as limited space permits, the author brings the new knowledge abreast of the times. The chapter on hydrocyanic acid poisoning is as delightful reading as the cyanogenesis of plants is important in the practice of veterinary medicine.

Books on chemicals, drugs, and plants injurious to livestock have values corresponding to the number and kind of such agents to which animals are exposed. Global-wide knowl-

edge of the subject is neither feasible nor necessary. Not so, however, with the gamut of toxic materials within one's environs. These ought to be known and studied well in order to keep alert on the toxic cataclysms encountered in the pursuit of one's practice. Such knowledge is a standing obligation to stockmen.

This book is as faithful, as is humanly possible, to a broad subject condensed into limited space, a valuable guide to collateral reading, and an obviously critical résumé which the author has organized in the form of brief messages that succeed admirably in touching the principal agents and factors that livestock toxicology naturally covers—namely: inorganic poisons, organic poisons and drugs, and poisonous plants.—[*Lander's Veterinary Toxicology. Revised by J. A. Nicholson, M.A., Ph.D., M.R.C.V.S., Professor of Physiology and Biochemistry, The Veterinary College of Ireland. Cloth. 329 pages. Alexander Eger, Inc., Chicago. 1945. Price $6.25.*]

Uranium and the Atomic Bomb

Remember how element 92, uranium 235, staged a quick stop to a raging war last year? This book tells how that came about. The name is "Uranium and the Atomic Bomb," describing, in understandable terms, a product of chemistry and physics destined to make the greatest and most sensational change in human affairs during all known history.

Matters of world-wide interest always make delightful reading, but "Uranium and the Atomic Bomb" is more than just thrilling. To be remembered is the fact that chemists and physicists are not preaching that the problem has been solved. It may never come to pass, optimistic as are some of the views published. The chemistry of uranium remains incomplete, and nothing much is yet predictable about the other "smashable" elements.

All that is certain is that atomic energy is here to use in war or to prevent war. The atomic bomb is a reality, developed secretly at the cost of 2 billion dollars in old, established laboratories and in newly erected ones located in scattered places. Scientists of the universities, of the industries, and of the military forces worked for three years on this greatest gamble of all time.

The book makes clear atomic power, the atomic bomb, the special properties of uranium, its qualitative and quantitative analysis, its chemistry and physics, its types, its occurrence in minerals, and the far-flung prospecting required to obtain enough to complete the bomb-making project for which Hiroshima and Nagasaki were used as the guinea pigs.

Though due credit is given to previous research, it is pointed out that the very thought of releasing atomic power would have been dubbed fantastic in 1939. The atomic bomb which was dropped from the sky on Japanese cities has to be credited exclusively to scientists of the United States, Britain, and Canada during the five years preceding its cataclysmic use as a weapon of war.

The authors announce the book for the use of laymen, students, chemists, and physicists. We commend it for the use of all mankind. Its seven chapters brings up to date the known facts about the potentiality of this astonishing scientific discovery. While its directives are intended for the chemist and the physicist, the book is a fascinating narrative of a historic achievement published at an opportune moment.—[*Jack De Ment, Research Chemist and Mineralogist, and H. C. Dake, Editors of The Mineralogist Magazine: Uranium and Atomic Power. Cloth. Illustrated. 341 pages. Chemical Publishing Co., Brooklyn. Price, $4.00.*]

The Cost of Producing Milk.—The cost of producing milk in the northern part of the state (a part of the Chicago milk shed), worked out by Wilcox and Rhode (*Illinois Agric. Exper. Sta., Bull.* 511), was 53.9 per cent for feed, 18.5 per cent for man labor, and 27.6 per cent for 13 other items. Fifteen per cent of the cost other than feed and labor fluctuated with feed costs and 45.0 per cent with farm labor. The study was made from cows averaging 8,328 lb. annually, which is higher than the yield per cow in that area. High-producing cows required less labor and feed for a given amount of milk than the low-producing ones, but these figures may be regarded as the basis for computing the cost of producing milk from cows of different production levels in that area.—*Abstracted by J. Dairy Sci.* 28, (*Nov.* 1945): *A170.*

THE NEWS

Facts About the 1946 Annual Meeting

Place—Boston, Mass.

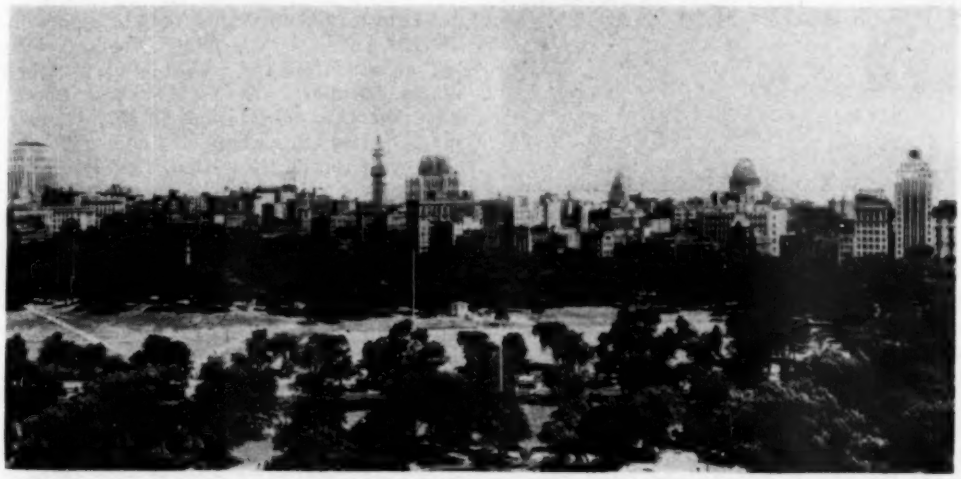
Date—August 19-22, 1946

Headquarters—Hotel Statler

Once again, after fifty-four years, the AVMA will convene in Boston next August for its eighty-third annual session. This will be the first full-scale meeting since 1942, since it is planned to resume section meetings which have had no programs for the past three years. The section officers, who comprise the Committee on Program, *ex officio*, are already at work arranging the scientific papers and discussions that will be presented.

Representatives from the AVMA office met, on February 3, with a committee from the Massachusetts Veterinary Association in Boston for the purpose of drafting tentative arrangements for the convention. It is planned to open the exhibits feature of the meeting on Monday morning, August 19, with the Opening Session scheduled for 2 p.m. the same day. Three additional days will be devoted to general sessions, section meetings, and other program functions; the convention will close Thursday afternoon, August 22.

Already much interest from far and wide is being expressed in the Boston session. Undoubtedly, much of this interest is due to the fact that a full-scale meeting is anticipated, but an equal amount probably can be credited to the "newness" of Boston as a meeting city for the present generation of AVMA convention-goers. The last meeting there was in 1892, and it is forty years since a meeting was held anywhere in New England (New Haven, 1906). Association members in that area are mindful of these facts and the local group is planning to make the 1946 session a memorable one.



—Courtesy Convention Bureau, Boston Chamber of Commerce

The Skyline of the Business Section of Boston, with Public Garden and Boston Common in foreground.

About Hotel Reservations

The Boston Hotel Statler reports that nearly 50 advance reservations have already been reing the week of the convention. This early ex-

ceived from AVMA members for occupancy durpression is unprecedented, particularly since no publicity has been given to the meeting aside from the announcement in the January JOURNAL that the Executive Board had selected Boston as the site, and the week of August 18 for the meeting.

Since housing conditions are not expected to be normal in most large hotels during 1946, it

—Courtesy, Convention Bureau, Boston Chamber of Commerce

The World Famous Minute Man Statue at Concord, Mass.

has been decided to establish a housing bureau to arrange and allocate the rooms that will be made available by the Hotel Statler and other Boston hotels during the AVMA convention week. The housing arrangements will be handled through a local committee in coöperation with the convention bureau and hotel association. A list of Boston hotels, giving the number and types of rooms that will be made available to AVMA registrants, will be published in a future issue of the JOURNAL. Reservations will probably be cleared through the local committee and the AVMA office.

For the present, it is suggested that those who are planning to attend the Boston meeting not request advance hotel reservations until housing plans are announced. However, if any reservations are requested, *the day of arrival must be specified.*

EXHIBIT FEATURES

Announcements and space diagrams for the technical (commercial) displays will be mailed to prospective exhibitors about the middle of March.

Plans are being made for several scientific and educational exhibits. It is hoped that it will be possible to develop this feature considerably now that many faculty and staff members are returning from military service to veterinary colleges and research institutions.

Surplus Medical Equipment for Veterans

Information relative to the purchase of surplus Army Medical Department items available to veteran veterinarians and other medical department officers separated from the service was recently made available. This surplus equipment may be bought directly from the disposal agency.

To assist the individual in obtaining surplus property, a listing of items by army medical catalog number, standard commodity classification number, and army nomenclature, together with price set by the disposal agency, has been prepared. This listing includes items appropriate for a professional office. Copies of the list are available in Service Command Headquarters, in various army hospitals, medical depots and disposal agency offices.

Veteran veterinarians should apply to the district office of the War Assets Corporation which is nearest the veteran's residence. These offices (formerly the Smaller War Plants Corporation) are maintained in about 110 of the major cities throughout the country.

Proper certification that the applicant purchaser is a veteran must be supplied and that the property applied for is to be used in his own small enterprise. Prospective purchasers should send or present their requirements to the nearest regional office of the disposal agency which are located as follows:

Atlanta 3—105 Pryor St., N. E.
Boston 11—600 Washington St.
Chicago 4—209 S. LaSalle St.
Cincinnati 2—704 Race St.
Denver 2—728 Fifteenth St.
Ft. Worth 2—Post Office Box 1407
Los Angeles 14—Pacific Mutual Bldg.
Kansas City 8—2605 Walnut St.
New York 1—350 Fifth Ave.
Philadelphia—Lafayette Bldg., 5th and Chestnut Sts.
San Francisco 2—30 Van Ness Ave.
Seattle 1—2005 Fifth Ave.

Regional offices will advise applicants as to items and their availability in that region, and in other regions. When all information is completed, the applicant will notify the War Assets Corporation regional office of the items

esired, forwarding certified check for the total mount involved.

Since considerable care must be exercised in eeting requirements for purchase of surplus quipment, it is suggested that interested vet-ran veterinarians get in touch with the nearest istrict or regional office of the War Assets orporation and obtain copies of information irculars, listings of items, and instructions hat must be followed in obtaining surplus upplies.

Surplus equipment listed specifically for eterinarians includes small items such as istouries, curettes, forceps, knives, scissors, eedle holders, headlamps, and instrument terilizers. Larger items are monocular micro-copes, dental x-ray machines, and equine op-rating tables. Other items have been recom-ended for inclusion in the surplus list, and it s understood that many items listed for physi-ians and dentists are also available to vet-ran veterinarians.

APPLICATIONS

The listing of applicants conforms to the requirements of the administrative by-laws—Article X, Section 2.

First Listing

BOARDMAN, WILLIAM
175 Montgomery Rd., Westfield, Mass.
D.V.M., Cornell University, 1935.
Vouchers: R. N. Barlow and R. L. Leighton.

COLLIER, JOHN R.
224 Ash St., Marysville, Ohio.
D.V.M., Ohio State University, 1941.
Vouchers: W. R. Hobbs and A. F. Schalk.

EVERSOLE, GARDNER S.
201 S. 5th St., Escanaba, Mich.
D.V.M., Michigan State College, 1934.
Vouchers: L. J. Heiden and F. K. Hansen.

FITTS, ROBERTTA L.
79 N. Main St., Chagrin Falls, Ohio.
B.V.Sc., Ontario Veterinary College, 1945.
Vouchers: D. C. Hyde and R. R. Laughlin.

GITZ, C. F.
1711 Mitchell Ave., St. Joseph, Mo.
D.V.M., Kansas City Veterinary College, 1912.
Vouchers: E. M. Lynn and R. E. Zwickey.

HALL, A. V.
P. O. Box 183, Basseterre, St. Kitts, B.W.I.
B.V.Sc., Ontario Veterinary College, 1942.
Vouchers: E. F. Jardine and J. G. Hardenbergh.

HILLMAN, FEDERICO
Casilla 327, Los Angeles, Chile, S. A.
M.V., Escuela de Medicina Veterinaria, Universidad de Chile, 1940.
Vouchers: J. San Miguel and O. Bastias.

JONES, FRANK M.
Sidell, Ill.
B.V.Sc., Ontario Veterinary College, 1937.
Vouchers: E. M. Lynn and H. J. Landskron.

JONES, WILLIAM D.
180 Longwood Ave., Boston 15, Mass.
B.V.Sc., Ontario Veterinary College, 1938.
Vouchers: G. B. Schnelle and E. F. Schroeder.

KAPLAN, MARTIN O.
Box 203, Kingston, R. I.
V.M.D., University of Pennsylvania, 1944.
Vouchers: E. M. Aldrich and L. F. Maier.

KLUG, JOHN H.
Random Lake, Wis.
D.V.M., Grand Rapids Veterinary College, 1917.
Vouchers: W. R. Winner and J. S. Healy.

MCBRIDE, FRANK
262 William St., Tonawanda, N. Y.
D.V.M., Cornell University, 1922.
Vouchers: F. E. McClelland and W. A. Dennis.

MURPHEY, WILLIAM
Box 747, Salesbury, Md.
V.M.D., University of Pennsylvania, 1939.
Vouchers: I. M. Moulthrop and E. J. McLaughlin.

NELSON, GEORGE W. I.
1234 N. Wilson Way, Stockton, Calif.
D.V.M., Ohio State University, 1920.
Vouchers: R. A. Ball and W. A. Browne.

NELSON, NELS J. I.
3799 Broadway, Oakland 11, Calif.
D.V.M., Ohio State University, 1920.
Vouchers: C. C. Warkentin and N. E. Clemens.

NUCKOLLS, MELVIN N.
1199 E. 66th St., Kansas City, Mo.
D.V.M., Iowa State College, 1940.
Vouchers: T. C. McChesney and A. H. Quin.

PELOT, WILLIAM L.
Rt. 1, Box 699, Joplin, Mo.
D.V.M., Texas A. & M. College, 1945.
Vouchers: A. A. Lenert and E. D. Dwelle.

REID, FRED E.
847 S. Iowa Ave., Washington, Iowa.
D.V.M., Chicago Veterinary College, 1913.
Vouchers: J. H. Krichel and H. S. Lames.

RYAN, MAURICE H.
Davis Veterinary Hosp., Post Road, Stamford, Conn.
B.V.Sc., Ontario Veterinary College, 1936.
Vouchers: R. H. Davis and J. B. Skelton.

SHANNON, WILLIAM H.
15 Clematis St., Dorchester 22, Mass.
V.M.D., University of Pennsylvania, 1911.
Vouchers: H. W. Peirce and C. R. Benton.

WARDALL, MURRAY N.
628-11th St., West Des Moines, Iowa.
D.V.M., Iowa State College, 1934.
Vouchers: C. E. Juhl and G. N. Richards.

WILLETTS, JANET M.
7056 Lanewood Ave., Hollywood 28, Los Angeles, Calif.
B.V.Sc., Ontario Veterinary College, 1945.
Vouchers: E. C. Jones and R. W. Adami.

WILLIAMSON, WALLACE L.
824 Grand Ave., St. Paul 5, Minn.
D.V.M., Ohio State University, 1915.
Vouchers: R. K. Somers and D. B. Stewart.

ZINOBER, MOSES R.
North Branch, Minn.
D.V.M., Michigan State College, 1938.
Vouchers: R. Fenstermacher and W. L. Boyd.

ZUNIGA, EDUARDO
Puyehue 1360, Santiago, Chile, S. A.
M.V., Escuela de Medicina Veterinaria, Universidad de Chile, 1930.
Vouchers: J. San Miguel and O. Bastias.

Second Listing

Alex, Charles, 4154 W. Van Buren, Chicago 24, Ill.

Bautista B., Alfonso, Calle Bolivar No. 22, Coro. Estado Falcon, Republica de Venezuela, S. A.

Covert, Milton H., 260 Inglewood Dr., Rochester 11, N. Y.

Gardiner, Meredith R. Jr., 123 County Line Rd., Bryn Mawr, Pa.

Kafka, Hellmut, 33 E. Upsal St., Philadelphia 19, Pa.

Pease, Ray H., 2017 Russell Ave., Cheyenne, Wyo.

Perlaza S., Francisco Antonio, Apartado Nacional 383, Cali, Valle, Colombia, S. A.

Pinckard, Wendell L., P. O. Box 381, Cleveland, Tenn.

Radmore, R. C. S., 531 Rideau St., Ottawa, Ont., Can.

Stearn, Benjamin F., No. 2—Second Ave., Haddon Heights, N. J.

1946 Graduate Applicants

First Listing

The following are graduates who have recently received their veterinary degrees and who have applied for AVMA membership under the provision granted in the Administrative By-Laws to members in good standing of junior chapters. Applications from this year's senior classes not received in time for listing this month will appear in later issues. An asterisk (*) after the name of a school indicates that all of this year's graduates have made application for membership.

Texas A. & M. College

BARCELONA, TONY JR., D.V.M.
Box 629, Bryan, Texas.
Vouchers: F. P. Jaggi and J. W. Barton.

State College of Washington

ADLER, HENRY E., D.V.M.
1812 B St., Pullman, Wash.
Vouchers: E. C. McCulloch and E. H. Peterson.

BEDDOE, LLOYD W., D.V.M.
Harvey Rd., Pullman, Wash.
Vouchers: E. H. Peterson and E. E. Wegner.

BENEDICTSON, BARNEY D., D.V.M.
P. O. Box 655, Tieton, Wash.
Vouchers: E. E. Wegner and J. E. McCoy.

BLAND, EDWARD C., D.V.M.
458-26th Ave., San Francisco 21, Calif.
Vouchers: G. J. Freiermuth and E. E. Wegner.

BUSH, FRANK J., D.V.M.
34 Berkeley St., Lawrence, Mass.
Vouchers: H. R. Zimet and E. E. Wegner.

EVANS, IVOR, D.V.M.
Tacoma Veterinary Hosp., Tacoma, Wash.
Vouchers: E. E. Wegner and J. E. McCoy.

GORHAM, JOHN R., D.V.M.
1807 E St., Pullman, Wash.
Vouchers: O. J. Hummon and E. E. Wegner.

JAKOTICH, ROBERT J., D.V.M.
c/o Crawnell Stage, Eureka, Calif.
Vouchers: G. J. Freiermuth and E. E. Wegner.

JAMISON, STANTON L., D.V.M.
5032-13th Ave., Sacramento 17, Calif.
Vouchers: W. D. Woodward and E. C. McCulloch.

JULIAN, LOGAN M., D.V.M.
9589 S. W. Pacific Hwy., Portland, Ore.
Vouchers: E. C. McCulloch and E. E. Wegner.

LINDLEY, DEAN C., D.V.M.
c/o Troy Lindley, Colfax, Wash.
Vouchers: E. H. Peterson and H. R. Zimet.

MILLER, FRANK E., D.V.M.
1408 Elliot Ave., W., Seattle 99, Wash.
Vouchers: E. H. Peterson and E. E. Wegner.

OLSEN, ROBERT W., D.V.M.
310 LaSalle Ave., Piedmont, Calif.
Vouchers: E. E. Wegner and J. E. McCoy.

PARKER, HORACE, D.V.M.
217 Grand Canal, Balboa Island, Calif.
Vouchers: G. J. Freiermuth and J. E. McCoy.

PETERSON, ROY H., D.V.M.
434 S. W. 5th St., Pendleton, Ore.
Vouchers: G. J. Freiermuth and E. E. Wegner.

SNOW, HAROLD D., D.V.M.
2421 Wilshire Blvd., Santa Monica, Calif.
Vouchers: E. E. Wegner and J. E. McCoy.

TAYLOR, GLENN E., D.V.M.
Rt. 4, Box 2015, Modesto, Calif.
Vouchers: E. E. Wegner and J. E. McCoy.

ZIEGLER, WALTER, D.V.M.
3486-17th St., San Francisco, Calif.
Vouchers: G. J. Freiermuth and E. E. Wegner.

Second Listing

Alabama Polytechnic Institute

Anderson, William M., D.V.M., 1134 Sampson Ave., Dyersburg, Tenn.

Kansas State College

Alt, Theodore W., D.V.M., 1115 Bluemont Ave., Manhattan, Kan.
Beuschel, Lorenz L., D.V.M., LaCygne, Kan.
Boebel, Frederick W., D.V.M., Rt. 1, Box 30, Naperville, Ill.
Bohmker, Fred A., D.V.M., 929 Brookridge Ave., Ames, Iowa.
Borgmann, August R., D.V.M., 1723 Fairview, Manhattan, Kan.
Burr, James H., D.V.M., 131 Mill St., Covington, Va.
Church, John W., D.V.M., Jerico Springs, Mo.
Cook, Morley H., D.V.M., c/o Fred Johansen, Holyrood, Kan.
Crawford, Dale I., D.V.M., Overbrook, Kan.
Duke, Lloyd M., D.V.M., Big Cabin, Okla.
Easley, Glynden T., D.V.M., Box 448, Portales, N. M.
England, Reid, B., D.V.M., 1738 Fairchild, Manhattan, Kan.
Fellman, Clarence K., D.V.M., Osage City, Kan.
Fenyk, John R., D.V.M., Rutland Rd., Harlingen, N. J.
Finkelstein, Alex B., D.V.M., Box 100, Kansas State College, Manhattan, Kan.
Gesellchen, Victor W., D.V.M., 1741 Anderson, Manhattan, Kan.
Greathouse, Leonard F., D.V.M., 237 S. Ashland Ave., Lexington, Ky,
Haggard, John M., D.V.M., Altamont, Kan.
Hardin, Russell W., D.V.M., R.R. No. 2, Knightstown, Ind.
Harvey, Max J., D.V.M., Kinsley, Kan.
Jackson William R., D.V.M., 116½ S. First St., Rogers, Ark.
Johnson, Marvin, D.V.M., 517 N. 14th St., Manhattan, Kan.
Keesee, Paul A., D.V.M., Rt. No. 1, Holdenville, Okla.
Keller, Garth V., D.V.M., R.F.D. No. 3, Mt. Carroll, Ill.
Kelly, Harold M., D.V.M., Verdon, Neb.
Kern, Doyle E., D.V.M., R.R. No. 3, Box 253, Ft. Collins, Colo.
King, Robert K., D.V.M., Rt. No. 1, Broken Arrow, Okla.
Kromminga, Myron C., D.V.M., Lennox, S. Dak.
Levine, Isaac, D.V.M., 2024 Thackrey, Manhattan, Kan.
Lightle, William T. Jr., D.V.M., Box 410, Globe, Ariz.
Lindsey, Paul J., D.V.M., Willacoochee, Ga.
Litt, Robert P., D.V.M., 6852 Paxton Ave., Chicago, Ill.
McClaughry, Larry E., D.V.M., Arlington, Neb.
McCully, Samuel M., D.V.M., LaRose, Ill.
McGown, Murlin L., D.V.M., McCune, Kan.
Maxfield, Albert, D.V.M., 2955 Holcomb Rd., Kansas City, Kan.
Nagakura, Roy S., D.V.M., 17 Kilohana St., Hilo, Hawaii.
Nipper, Orris W., D.V.M., Magnolia, Ark.
Noordsy, John L., D.V.M., Marion, S. Dak.
Pritchard, William R., D.V.M., Randolph, Wis.
Ratliff, Teddy B., D.V.M., Portis, Kan.
Ross Erven A., D.V.M., 421 N. 16th, Manhattan, Kan.
Runnels, Lewis J., D.V.M., 1607 N. Waco, Wichita, Kan.
Scarr, David N., D.V.M., 70 Mertz Ave., Hillside, N. J.
Schultz, George W., D.V.M., Shattuck, Okla.
Shively, James N., D.V.M., R.F.D. No. 1, Moran, Kan.
Sigars, Garold O., D.V.M., 1827 Frederick Ave., St. Joseph, Mo.
Simon, Joseph, D.V.M., Duanesburg, N. Y.
Snider, Lewis A., D.V.M., 5288 Pleasant Run Blvd., Indianapolis, Ind.
Sorensen, Dale K., D.V.M., Centuria, Wis.
Spangler, George W., D.V.M., 2021 Randolph, Topeka, Kan.
Spencer, Richard H., D.V.M., Oakley, Kan.
Steinmetz, Hyman, D.V.M., 49 Millet St., Dorchester 24, Mass.
Stuesser, Ralph H., D.V.M., Richfield, Wis.
Sutcliffe, John W., D.V.M., Rt. No. 5, Manhattan, Kan.
Swartz, Donald F., D.V.M., Soldier, Kan.
Taylor, Kenneth E., D.V.M., Osborne, Kan.
Theobald, William, D.V.M., Raub, N. Dak.
Trotter, Donald M., D.V.M., Dawson, Minn.
Van Walleghen, Albert K., D.V.M., Fisher Rd., Shawnee, Kan.
Waite, John R., D.V.M., Fenton, Iowa.
Walstrom, Veryl A., D.V.M., Spencer, Iowa.
Wechman, Dean K., D.V.M., Holton, Kan.
Weinman, Donald E., D.V.M., 2525 O St., Lincoln 8, Neb.
Weiseth, Werner H., D.V.M., Colman, S. Dak.
Winchester, William J., D.V.M., 565 E. Garvey Blvd., El Monte, Calif.
Woodbridge, John P., D.V.M., Huntsville, Ark.
Woods, George T., D.V.M., Caney, Kan.

AMONG THE STATES

California

State Association Conference.—For the fourth successive year, the annual meeting was held at California Polytechnic School, San Luis Obispo, on Jan. 15-17, 1946.

The conference was opened by President E. C. Baxter, and the program included the following:

Dr. E. J. Frick, Kansas State College, Manhattan: "Digestive Disturbances in Cattle," "Small Animal Practice" and "Cesarean Section in the Cow."

Dr. H. S. Cameron, University of California, Davis: "Swine Brucellosis."

Dr. A. K. Carr, State Division of Animal Industry, Sacramento: "California's Brucellosis Program."

Dr. Benjamin Schwartz, Zoölogical Division, BAI, Washington, D. C.: "Large Animal Parasites" and "Small Animal Parasites."

Raymond R. Staub, M.D., Portland, Ore.: "Brucellosis."

Dr. Rex Taylor, San Jose: "Observations in Small Animal Practice."

Capt. Charles Cook, who was shot down over France on his 99th mission, discussed: "Four Years in a German Prison Camp."

Major N. F. Christensen: "Veterinary Experiences in China."

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Southern California.—The Southern California Small Animal Veterinary Medical Association met on Dec. 28, 1945, at the Pasadena Athletic Club, in a joint session with the Southern California Veterinary Medical Association. The program consisted of films on heredity, digestion, and Los Angeles county's rat extermination project.

s/C. M. BAXTER, Secretary.

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Swine Brucellosis.—Dr. H. S. Cameron, University of California, Davis, discussed the advantages and limitations of a program to control swine brucellosis, at a special meeting of swine breeders on Jan. 6, 1946, at Fresno.

s/JOHN L. TYLER

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Personal.—Dr. J. W. Britton has resigned his position with the University of California, Davis, to become resident veterinarian for Mr. C. S. Howard, Ridgewood Ranch, Willits, Calif.

Colorado

Leaves for Peru.—Dr. V. D. Stauffer (Colo., '42) has left his position as ambulatory clinician in the Department of Surgery at Colorado A & M College, to accept an appointment as veterinarian by the office of Inter-American Affairs, Food Supply and Nutrition Division, to be stationed at Lima, Peru.

Dr. V. D. Stauffer

Dr. Stauffer is the first veterinarian to be employed for this work, although the project has been in effect for several years. The office of Inter-American Affairs is an agency of the United States, and the Food Supply Division is working toward improvement of the agricultural and livestock industries of the smaller South American countries.

As his first duty in Peru, Dr. Stauffer will make a survey to determine some of the important disease problems, and then develop control programs for these problems. Present plans allow about eighteen months to be spent in completing the survey and getting the control program well established.

Connecticut

Returns to Storrs.—Dr. E. L. Jungherr (V.I., '21) has resumed his duties as Professor of Animal Pathology at the University of Connecticut. He was on leave of absence to participate in the War Research Project, Department of Comparative Pathology and Tropical Medicine, Harvard Medical School, Boston, Mass.

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Officers Elected.—The following officers were elected at the annual meeting of the Connecticut Veterinary Medical Association, which was held in Hartford on Feb. 6, 1946: Dr. Richard Gilyard, Waterbury, *president;* Dr. J. W. Knapp, Litchfield, *first vice-president;* Dr. G. E. Corwin, Hartford, *secretary-treasurer* (reëlected).

Members of the board of censors are Drs. Jean Smith, Norwalk; G. LeRoy Cheney, Woodbridge; J. W. Watt, West Haven; Edwin Laitinen, West Hartford; and F. F. Bushnell, Manchester.

The next quarterly meeting will be held at the Hotel Elton, on Wednesday, May 1, 1946.

s/ G. E. CORWIN, *Secretary.*

District of Columbia

District Association.—The District of Columbia Veterinary Medical Association held its first regular meeting of 1946 at the Mayflower Hotel on January 16. The following program was presented:

Dr. Frank D. Enzie, Zoölogical Division, BAI, Washington, D. C.: "Recent Developments in Canine Anthelmintics."

Dr. James H. Steele, U. S. Public Health Service, Washington, D. C.: "Public Health and Veterinary Problems Encountered in the Caribbean Area." (Illustrated.) The motion picture, "The Science of Milk Production", also was shown.

Officers elected for 1946 were: Col. Raymond Randall, Washington, D. C., *president;* Dr. Mason Weadon, Washington, D. C., *first vice-president;* Dr. William M. Mohler, Washington, D. C., *secretary-treasurer.*

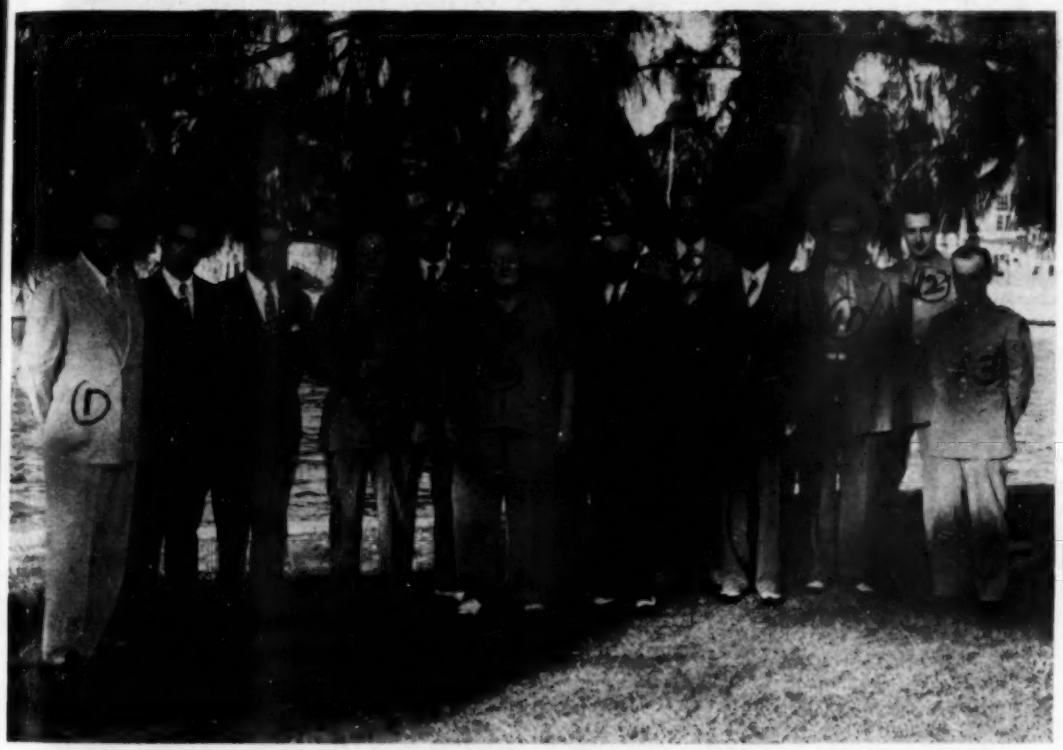
S/WILLIAM M. MOHLER, *Secretary.*

Florida

Honor to Editor Merillat.—On Sunday, January 13, veterinarians and visitors of metropolitan Miami honored Dr. L. A. Merillat, editor of the JOURNAL of the American Veterinary Medical Association, and Mrs. Merillat at a buffet party given by Col. L. A. Merillat, Jr., native land of the host and hostess, also are Miami Beach colonists.

Among the Army guests at these receptions were Brig. Gen. and Mrs. Raymond A. Kelser, Brig. Gen. and Mrs. Julius H. Houghton, and Col. and Mrs. William Briton, a veteran of World War I, who resigned as football coach at the University of Tennessee to rejoin the Army. Houghton, Kelser, Cistero, Briton, Merillat, and Merillat, Jr., were all "soldiers of the first World War."

The Cistero's entertained at their palatial new home on Sunset Island, Four. Another distraction of this memorable "veterinary invasion of Miami Beach" was a day of deep sea



Miami veterinarians and visitors "pull off" a surprise party on the editor at the home of Col. Louis A. Merillat, Jr., Collins Island, Miami Beach, on Sunday, January 13.

Left to right—(1) Dr. James G. Catlett, (2) Dr. C. E. Bild, (3) Dr. Levenson, (4) Brig. Gen. R. A. Kelser (V.C.), (5) Dr. Stanley C. Wasman, (6) Dr. L. A. Merillat, (7) Major Tyler J. Young (V.C.), (8) Dr. Cecil Yarborough, (9) Unidentified, (10) Dr. A. Eichhorn, (11) Dr. Oscar Glueck, (12) Major McCarthy, and (13) Major Henshaw.

commanding officer of Miami Beach Service Base. The veterinarians present are shown in the picture. On Friday evening, January 25, Lt. Col. and Mrs. Joseph A. Cistero gave a cocktail party and buffet in Dr. and Mrs. Merillat's honor and brought together a cosmopolitan group of friends. Among the guests were Baron and Baroness Nieuwenhove, former residents of Sunset Island, who have returned to Miami Beach for the winter. Other guests from France, fishing at which General Kelser won the poundage record and Adolph Eichhorn caught the biggest fish—a barracuda longer than a yardstick.

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Personal.—Dr. D. W. Jensen (Colo., '44), 4644 Main St., Jacksonville, has one client, the Harrisville Combing Mills, Inc., which operates a large dairy at Eleuthera, Bahamas. Travelling by plane, Dr. Jensen spends one week each month with this herd.

Illinois

Veterinarians Head Loss Prevention Board.—At the annual meeting of the National Live Stock Loss Prevention Board in Chicago, Feb. 6, 1946, the following veterinarians were elected to various offices for the ensuing year: Dr. W. A. Young, Chicago, *chairman;* Dr. W. J. Embree, Columbus, Ohio, *vice-chairman;* Dr. H. Preston Hoskins, Evanston, Ill., *secretary* (reëlected).

This is believed to be the first time that the principal offices of the board have been occupied all at the same time by veterinarians. Other members of the profession who serve on the board are Dr. L. R. Frederick, Chicago, Dr. C. D. Lowe, Washington, D. C., and Dr. J. A. Barger, Des Moines, who are directors, and Dr. W. T. Spencer, who is regional manager at Omaha, Neb. Dr. Barger has represented the AVMA on the board for the past two years.

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Chicago Association.—The Chicago Veterinary Medical Association met on February 12, for its first meeting under the new officers. Dr. W. A. Young presented case histories and autopsy reports on a wide variety of interesting specimens from Lincoln Park Zoo and urged a wider interest in work of this nature.

Officers for 1946 are Dr. Rudolph Trader, *president;* Dr. Matt J. Skala, *vice-president;* and Dr. R. C. Glover, *secretary-treasurer.*

s/ R. C. GLOVER, *Secretary.*

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Ten Years with BCG.—The results of a ten-year trial of BCG (Bacterium Calmette-Guérin) to prove the value of inoculating children against tuberculosis were reported at the thirty-fifth clinical session of the Tuberculosis Sanatorium Conference of Metropolitan New York in coöperation with the New York Tuberculosis and Health Association. The Chicago experimenters presented records showing that in the first seven years of life BCG is of value in preventing tuberculosis.

Indiana

Joins Purdue Staff.—Dr. H. E. Moses (O.S.U., '36) has been appointed associate pathologist, of the Purdue Agricultural Experiment Station. Dr. Moses was formerly special research assistant of the War Research Project in the Department of Comparative Pathology and Tropical Medicine, Harvard Medical School, Boston, Mass.

Iowa

State Association.—The Iowa Veterinary Association held its fifty-eighth annual meeting at Des Moines, Jan. 22-24, 1946.

The president's address was delivered by Dr. V. B. Vanderloo, of Dubuque. In addition to reports of the officers and committees, the scientific program consisted of the following numbers:

Dr. H. E. Pinkerton, Ft. Dodge: "Swine Diseases."

Dr. R. C. Newton, Chicago, chairman, Committee on Services for Farm Animals, National Research Council: "Morbidity and Mortality of Livestock."

Dr. L. Meyer Jones, Iowa State College, Ames: "Recent Advances in Drug Therapy."

Dr. George B. Senior, Creston: "Diseases of Poultry."

Dr. C. C. Hastings, Williamsville, Ill.: "Some Newer Findings in Nutrition of Farm Animals."

Dr. Peter J. Germanio, Centerville: "The Veterinarian and World War II."

Dr. W. L. Boyd, University of Minnesota, St. Paul: "Bovine Brucellosis."

Dr. W. C. Glenney, Elgin, Ill.: "Motion Pictures in Color."

Dr. J. V. Lacroix, Evanston, Ill.: "Small Animal Practice."

Dr. J. G. Hardenbergh, AVMA Office, Chicago: "Veterinary Medicine in America."

The feature of the meeting was a forum, "Phases of Veterinary Medicine," conducted by Dr. W. L. Boyd with a panel consisting of Drs. Glenney, Hastings, Jones, Lacroix, Senior, and Pinkerton.

Officers elected were: Dr. P. O. Dorweiler, West Bend, *president;* Dr. W. H. Riser, Des Moines, *first vice-president;* Dr. C. C. Franks, Des Moines, *secretary-treasurer.*

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East Central Iowa Veterinary Medical Society.—Forty-seven veterinarians from 15 counties assembled for a dinner meeting at the YMCA, Cedar Rapids, Jan. 10, 1946, for the following program:

Dr. E. M. Berroth, Cedar Rapids: "The U. S. Meat Inspection Service."

Mr. J. Morris Christy, Cedar Rapids: "Use of Phenothiazine in Lambs."

Drs. H. N. Strader, Marion; G. A. White, Riverside; J. C. Glenn, Norway; and H. E. Tyner, New London: "Mistakes Made in Veterinary Practice."

Drs. L. C. Swain, Wellman; D. T. White, Williamsburg; Robert J. Lenz, Marion; and John B. Bryant, Mt. Vernon, presented case reports.

Dr. J. H. Krichel, Keokuk, president of the Eastern Iowa Veterinary Medical Association, presented plans for the Association during 1946.

s/JOE W. GIFFEE, *Secretary-Treasurer.*

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Honor Dr. Baughman.—"Among the States" is indebted to *The Iowa Veterinarian* for the report of the testimonial ceremony given in honor of Dr. D. E. Baughman (C.V.C., '92), founder and former president of Fort Dodge Serum Company, at the Wahkonsa Hotel in

Fort Dodge, Iowa, on Oct. 15, 1945, by his coworkers and friends who met to extoll the sterling character of their former chief and to present a token of their admiration in the form of a plaque and testimonial letter signed by the stockholders of the company. Dr. Beth Vincent, of Boston, Mass., acted as the toastmaster. Among those present were Drs. James Nicolson, J. O. F. Price, J. M. Vernon, C. C. Franks, and R. D. Wall. Dr. Baughman's early work in putting the production, regulation, and use of hog-cholera antiserum and virus on a sound footing as well as developing one of America's large serum plants are among some of the accomplishments of his career.

Kansas

State Association.—The annual meeting of the Kansas Veterinary Medical Association was held at Topeka, Jan. 14-15, 1946. In addition to reports of the officers and committee chairmen, the following program was presented:

Dr. George A. Rathman, Topeka: "President's Address."

Dr. R. C. Klussendorf, AVMA Office, Chicago: "General Herd Management" and "Ketosis in Cattle."

Mr. Will J. Miller, State Livestock Sanitary Commissioner, Topeka: "State Livestock Regulations."

Dr. F. H. Suits, Odessa, Mo.: "General Practice Problems."

Dr. J. B. Gingery, Muscatine, Iowa: "Swine Disease Problems."

Dr. F. R. Beaudette, N. J. Agricultural Experiment Station, New Brunswick: "Poultry Diseases."

Dr. W. E. Logan, BAI inspector-in-charge, Topeka: "The Relationship of the Federal Bureau Field Veterinarian to General Practitioners."

Superintendent McFarland, of the Topeka public schools, was the banquet speaker. He presented a review of the events which followed World War I and led up to World War II.

Officers elected were: Dr. J. F. Knappenberger, Hutchinson, *president;* Dr. Wm. A. Adams, Glasco, *vice-president;* Dr. C. W. Bower, Topeka, *secretary-treasurer* (reëlected.)

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Borden Winner.—The first award under the Borden Scholarship Fund at Kansas State College was won by Mr. Isaac Levine, of 738 Rockway Ave., Brooklyn, N. Y. The award carries a stipend of $300 and is awarded "to that eligible student who has achieved the highest average grade of all similarly eligible students in the veterinary curriculum preceding their senior year."

s/R. R. DYKSTRA, Dean.

Kentucky

State Association.—The members of the Kentucky Veterinary Medical Association met at Lexington, Jan. 31 to Feb. 1, 1946, as guests of the University. The following program was presented:

Dr. P. R. Edwards, University of Kentucky: "Salmonella Infections in Domestic Animals."

Dr. F. E. Hull, University of Kentucky: "Field Diagnosis of Poultry Diseases" and "Disorders of Metabolism in the Cow."

Dr. E. R. Doll, University of Kentucky: "Penicillin Dosage and Indications for Equine Infections" and "A Survey of Literature on Penicillin Therapy for Mastitis."

Dr. C. R. Donham, Purdue University, Lafayette, Ind.: "Swine Diseases" and "The Relationship Between the Veterinary Practitioner, the State Institution, and Livestock Interests."

Capt. D. W. Bruner, Ithaca, N. Y.: "Unusual Animal Diseases Observed During My Service in the Army."

Dr. Fordyce Ely, University of Kentucky: "Artificial Insemination."

Dr. C. Westerfield, University of Kentucky: "The Use of DDT in Veterinary Medicine."

Dr. Glen L. Dunlap, of Ashe Lockhart, Kansas City, Mo.: "Rabies."

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Joint Meeting Planned.—The Kentucky Veterinary Medical Association, at its mid-winter meeting, decided to invite members of the Southern Veterinary Medical Association to meet with them at the Phoenix Hotel, Lexington, on September 30, October 1 and 2, 1946. It is anticipated that more than 500 delegates, members, and visitors will attend this meeting.

s/F. M. KEARNS, *Secretary-Treasurer.*

Maine

State Association.—Members of the Maine Veterinary Medical Association met Jan. 9, 1946, at Hallowell, to hear papers delivered by Drs. A. E. Coombs, Skowhegan; Bertrand Dionne, Brunswick; and S. D. Merrill, South Paris.

s/S. D. MERRILL, *Secretary.*

Massachusetts

Annual Meeting.—The annual meeting of the Massachusetts Veterinary Medical Association was held on Jan. 23, 1946. Following a dinner at 6:15, Dr. G. B. Schnelle, Angell Memorial Hospital, Boston, delivered an illustrated lecture entitled "Radiology in Small Animal Practice."

s/H. W. JAKEMAN, *Secretary.*

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Personal.—Dr. H. B. Siegle has resigned his position with the Angell Memorial Hospital and now operates the Dedham Hospital for Animals, 201 Bridge St., Dedham, Mass.

Michigan

Twenty-Third Postgraduate Conference.—Michigan State College conducted its annual conference for veterinarians, Jan. 22-25, 1946. Small groups saw demonstrations and heard lectures by staff members on practically all phases of veterinary practice during the first and the last days of the conference. The sessions of the twenty-third and twenty-fourth included presentations by:

Dr. A. L. MacNabb, dean, Ontario Veterinary College, Guelph: "The Veterinarian and Public Health." This subject was discussed by Drs. E. J. McLachlan, head of the Health Department of Jackson; M. D. Baum, city veterinarian, Los Angeles, Calif.; and Mr. H. J. Dunsmore, Ann Arbor.

Dr. M. H. Roepke, University of Minnesota, St. Paul: "Milk Fever" and "Acetonemia." The latter subject was discussed by Dr. C. F. Huffman, Michigan State College, East Lansing.

Mr. Charles Figy, director, Michigan Department of Agriculture: "The Bonine Law and the Bang's Disease Committee."

Dr. P. A. Hawkins, Michigan State College, East Lansing: "Trichomoniasis Diagnosis."

Dr. R. C. Klussendorf, AVMA Office, Chicago: "Cattle Herd Health" and "Reproductive Problems."

Dr. B. T. Simms, chief, BAI, Washington, D. C.: "Diseases of Calves."

Dr. I. F. Huddleson, Michigan State College, East Lansing: "Antibiotics."

Mr. L. E. Harris, Norden Laboratories, Lincoln, Neb.: "Veterinary Use of Penicillin."

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Junior AVMA.—At a meeting of the junior chapter of the AVMA, Dr. B. T. Simms reviewed "Animal Disease Research Problems." Also, the following motion pictures were shown, "Physiology of Milk Production," by Dr. W. E. Petersen; "The Veterinarian's Public Relations," an Allied Laboratories film; and "Surgical Sutures," a Singer Sewing Machine Company film.

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Personal.—Dr. Melvin J. Klooster, discharged by the Army, with the rank of major, from his post as station veterinarian of Smyrna Army Air Field, Smyrna, Tenn., has resumed his general practice at Jamestown.

Minnesota

State Association.—The Minnesota State Veterinary Medical Society held its forty-ninth annual meeting at Minneapolis, Jan. 28-30, 1946. President C. F. Schlotthauer called the meeting to order and delivered his address. This was followed by reports of the officers and committee chairmen. The following program was presented:

Dr. J. L. Bollman, Mayo Foundation, Rochester: "The Physiology of the Liver."

Dr. R. C. Klussendorf, AVMA Office, Chicago: "Reproductive Problems of the Cow and Raising the Calf."

Dr. F. W. Wittich, secretary, American College of Allergists, Minneapolis: "Allergy in the Dog." (Illustrated.)

Dr. J. M. Krichel, Keokuk, Iowa: "The Treatment of Small Animals in a Mixed Practice."

Dr. L. H. Scrivner, Wellman, Iowa: "Problems in Turkey Disease Control."

Mr. L. L. Baumgartner, secretary, Minnesota Baby Chick Co-operative Association, Litchfield: "Veterinary Services to the Hatchery Industry." This was discussed by Drs. L. M. Skamser, Litchfield; E. J. Kerr, Minneota; and E. R. Carpenter, Minnesota Lake.

Dr. T. L. Steenerson, Wilkinson, Ind.: "Something to Think About in Practice."

Dr. R. L. West, St. Paul: "The State Livestock Sanitary Board."

Dr. R. J. Coffeen, Stillwater: "The Veterinary Examining Board."

New York

Journal of the History of Medicine.—*Journal of the History of Medicine and Allied Sciences* (a quarterly, subscription price $7.50 the year) appeared in January under the editorship of Dr. George Rosen, an editorial board of four members and 43 consulting editors, about half of whom are in foreign countries. Stated objects: (1) "to help medical men better understand daily tasks through a knowledge of the history of the medical past, and (2) to supply cultural stimulation and pleasurable moments to those to whom medical history is a hobby and a joy."—*Science, 103, (Jan. 11, 1946):* 47.

North Carolina

Eighth Annual Conference.—North Carolina State College entertained the veterinarians of the state at their eighth annual conference at Raleigh, Jan. 22-25, 1946. The following program was presented:

Dr. R. E. Comstock, N. C. State College: "The General Objectives and the Philosophy Behind the Regional Swine Breeding Laboratory."

Dr. H. A. Stewart, N. C. State College: "Progress in the Regional Swine Breeding Laboratory."

Dr. R. S. Dearstyne, N. C. State College: "The Poultry Industry in North Carolina."

Dr. H. C. Gauger, N. C. State College: "Pullorum Disease."

Dr. E. P. Johnson, Virginia Agricultural Experiment Station, Blacksburg: "Leucosis" and "Johne's Disease."

Dr. H. C. Smith, Allied Laboratories, Sioux City, Iowa: "The Practical Application of Penicillin in Veterinary Medicine."

Dr. John C. Lotze, BAI, Washington, D. C.:

"The Diagnosis and Treatment of Anaplasmosis."

Dr. William M. Roberts, N. C. State College: "The Quality Milk Problem."

Mr. J. H. Heald, Southern Dairies, Winston-Salem: "The Veterinarian's Interest in the Consumption of Dairy Products."

Dr. George Hopson, New York City: "Mastitis and the Practitioner," "The Use and Misuse of Milking Machines," and "The Herd Survey and Mastitis Control."

Dr. A. G. Danks, Cornell University, Ithaca, N. Y.: "The Surgical Diseases of the Cow" and "Surgical Diseases of the Horse."

Harold N. Johnson, M.D., director of the rabies laboratory, Montgomery, Ala.: "Experimental and Field Studies on Canine Rabies Vaccination" and "Report of National Research Council Subcommittee on Rabies."

Dr. John H. Hamilton, State Hygiene Laboratory, Raleigh: "Rabies in North Carolina."

Dr. Otto Stader, Ardmore, Pa.: "Distemperoid Virus As a Prophylactic and Therapeutic Agent in the Treatment of Distemper in Dogs" and "The Management of Fractures in Small Animals."

Dr. Clyde F. Smith, N. C. State College: "DDT."

Three panel discussions were presented. The panel on Swine Diseases was discussed by Drs. N. B. Tyler, Raleigh; Bruce Staton, Rocky Mount; L. J. Faulhaber, Raleigh; and H. A. Stewart, N. C. State College.

The panel on Poultry Diseases was discussed by Drs. H. C. Gauger, N. C. State College; E. P. Johnson, Virginia Agricultural Experiment Station, Blacksburg; M. G. Edwards, Wilkesboro; C. E. Nicks, Elkin; and B. M. Weston, Asheboro.

The panel on Rabies was discussed by Drs. H. J. Rollins, Rockingham; J. H. Hamilton, Otto Stader, Ardmore, Pa.; E. L. Shuford, Asheville; C. B. Randall, Timberland; P. C. McClain; and A. Gordon Danks, Cornell University, Ithaca, N. Y.

A small animal clinic was conducted by Drs. M. M. Leonard, Asheville; E. F. Boyette, Smithfield; William Moore, Jr., Raleigh; J. I. Neal, Southern Pines; and G. R. Armstrong, Charlotte.

A large animal clinic was conducted by Drs. S. A. Alexander, Monroe; C. B. Randall, Timberland; J. C. Bateman, Greenville; A. Gordon Danks, Cornell University, Ithaca, N. Y.; and George Hopson, New York City.

North Dakota

State Association.—Officers elected at the annual meeting were: Dr. G. J. Worner, Bismarck, *president;* Dr. J. F. Hinz, Lidgerwood, *vice-president;* and Dr. F. M. Bolin, N. D. Agricultural College, *secretary-treasurer.*

s/T. O. BRANDENBURG, *Resident State Secretary.*

Ohio

Dr. Walter R. Krill, professor of veterinary medicine at The Ohio State University, has been appointed dean of the College of Veterinary Medicine at that institution. The announcement was made by President Howard L. Bevis, following approval by the university's board of trustees. He succeeds Dr. Walter R. Hobbs, who has been doing double duty as secretary and acting dean of the college since the death of Dr. Oscar V. Brumley in January, 1945.

Born on a farm at Edgerton, Defiance county, Ohio, April 13, 1902, Dr. Krill lived and worked

Dr. Walter R. Krill

at home until 1919, when he entered The Ohio State University where he received the degree of B. Sc. with a major in Animal Husbandry in 1923, and the D. V. M. degree in 1927.

After two years of association with Dr. E. V. Hoover, of Lima, Ohio, in general practice, he was called back to his alma mater in 1929 to take charge of the ambulatory clinic. He held the rank of instructor until 1935, assistant professor from 1935 to 1940, associate professor 1940-44, and full professor since 1944. He also has been an associate in the department of animal husbandry of the Ohio Agricultural Experiment Station, Wooster.

Dr. Krill has been active in Ohio state association affairs as well as in those of the American Veterinary Medical Association. He has repeatedly held offices and committee chairmanships in his state association, and since joining the AVMA in 1930, he has acted as delegate to the House of Representatives for five years. He was elected a member of the Executive Board from the tenth district in 1944. He is chairman of the AVMA Special Committee on National Board of Veterinary Examiners, and of the Sub-committee on Veter-

inary Training of the National Research Council. He is the author of a number of technical articles which have appeared in professional journals.

Dr. Krill is a member of Phi Zeta and an honorary member of Alpha Psi and Omega Tau Sigma.

Panama

Monthly Meetings.—The Canal Zone Veterinary Medical Association held its monthly meeting on February 21, at the Atlas Club, Panama City. The next meeting will be held March 21, at the Strangers' Club, Colon.

S/ROBERT G. MATHENEY, *Secretary.*

Philippines

Light on the Philippine Situation.—The following letter and enclosure, received by the editors from Dr. Stanton Youngberg, formerly of the Philippines and now in California, are self-explanatory.

TO THE EDITOR:

I am inclosing herewith a letter addressed to the United Nations Relief and Rehabilitation Administration, which is self-explanatory. It was sent by air-mail, but as yet I have received no acknowledgment of its receipt.

At the present time the whole set-up in the Philippines is, to say the least, very confused. In so far as the government is concerned, many of its old and experienced men are either out of office or in jail as collaborators under suspicion of being such. In consequence many young men have, perforce, had to be placed in top-flight positions. The man who is Acting Chief of the Bureau of Animal Industry is a man so young in the service that I have no recollection of ever having met him. Needless to say, the pressure that will be applied to him to permit the importation of livestock from Asia is going to be terrific. I know, for I went through all that myself; and I am certain that the pressure now will be even stronger than it was in my time.

I have discussed this matter with Drs. W. H. Boynton and F. W. Wood, two of my old Philippine coworkers, and they, too, are very apprehensive that rinderpest might be re-introduced into the P. I., should livestock importation be resumed. Would you feel inclined to give the young fellows in the Philippine Bureau of Animal Industry a helping hand? If so, it need not be a long article; just a few paragraphs. As a suggestion, you might refer to the report of UNRRA activities in the P. I., dwell on the fact that the Philippine Bureau of Animal Industry eradicated rinderpest after a difficult fight of more than a quarter of a century and then express the hope that if the importation of animals from Asia is the only possible solution to the present difficulties of Philippine agriculture, every precaution known to veterinary science will be taken to prevent the disaster of again introducing rinderpest into the Islands. If you can see your way clear to do this, it will be doing our profession in the Philippines a very good turn.

Mrs. Youngberg and I were also unwilling guests of the Japanese army in the P. I. for more than three years. When we were liberated my weight had gone down to 105 pounds and I had acquired a bad heart among other things. If General MacArthur's army had not come when it did, I am afraid that I would not have been able to hang on much longer.

Arrived at San Francisco in the hospital of the Army Transport Torrens on May 15, and was immediately taken to the Stanford University Hospital, remaining there almost four months. Have been in this city for further recuperation ever since being released from the hospital. We will spend the winter here and return to Ohio with the advent of the warm weather. Am certainly glad that I did not tempt fate by going to Ohio this winter, for I have no inclination to flirt with pneumonia.

I trust that Father Time has dealt very gently with you and that you will enjoy the best of health for many years to come. With kindest personal regards, I am,

Jan. 7, 1946 S/STANTON YOUNGBERG.
339 Kellog Ave.,
Palo Alto, Calif.

WARNING ON RINDERPEST

TO DIRECTOR, AGRICULTURAL DIVISION,
UNITED NATIONS RELIEF AND REHABILITATION ADMINISTRATION,
WASHINGTON 25, D. C.

Today an old Philippine colleague handed me a copy of *The Sunday Times*, Manila, Philippines, of September 23, 1945. It contains an article that is rather disturbing to me and so impels me, perhaps rather gratuitously, to sound an urgent note of warning. This article refers to the UNRRA activities in the Philippines and among others contains the following statement:

> Agricultural rehabilitation of the Islands is a serious problem according to Briggs. In work animals alone there has been a reduction of from 30 to 40 per cent on account of the war. Hence the requisition for cattle and water buffaloes from China, Indo-China, and Australia.

The devastating plague of cloven-hooved animals known as rinderpest is enzoötic on the continent of Asia. It was first introduced into the Philippines from Indo-China in 1886, with further introductions from that country and China following the Spanish-American War and

the Philippine Insurrection. For almost half a century it was the great scourge of Philippine agriculture and it is less than ten years ago since it was finally eradicated from those Islands. The annual reports of the Philippine Bureaus of Agriculture and Animal Industry, from 1902 on, clearly set forth the almost heartbreaking struggle involved in its conquest. To begin again to import live animals from Asia might bring about the reintroduction of rinderpest into the Philippines and cause a still further depletion of the livestock population instead of adding to it. One must always bear in mind that the Philippine water buffalo is very susceptible to rinderpest.

I went to the Philippines in 1907 as a veterinarian with the insular Bureau of Agriculture and for twenty-five years was in the thick of the fight against rinderpest. I was at different times Chief Veterinarian, Director of Agriculture, and Director of Animal Industry. I retired from the Philippine service on Dec. 31, 1933.

Dec. 18, 1945 s/STANTON YOUNGBERG.
Palo Alto, Calif.

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Personal.—Capt. Harold C. King is now stationed at Manila, where he is buying fruits and vegetables for all troops in the area. Previously, he spent more than six months in Belgium, France, Holland, and Germany, where he inspected food for the forward troops and was so close to action that he received two battle stars.

Puerto Rico

Rebuttal on Sanitary Conditions.—The October 1945 issue of the JOURNAL carried some remarks from a Veterinary Corps officer who had been stationed in Puerto Rico for two years. In answer to those remarks, we have a letter from Dr. O. A. Lopez-Pacheco, Hato Rey, from which the following is taken: "As a Puerto Rican, I challenge that anonymous veterinarian to point out some unsanitary condition that may exist here, whether in urban or rural areas, that I cannot match with a similar one, or worse, in his own state.

"The records of the Board of Health of Puerto Rico are kept in the government archives, and in them you can find wonderful sanitary measures and regulations that were promulgated by that body. Many of them were not carried into effect because of lack of funds, yes, because Puerto Rico (Rich Port) is poor, but we like cleanliness and good sanitary conditions. It is very unfortunate that the writer did not express his views to the veterinarians of Puerto Rico while he was here. We could have shown him how we live in better sanitary surroundings than those he evidently dwelled upon."

s/O. A. LOPEZ-PACHECO.

Texas

State Association.—The State Veterinary Medical Association of Texas met at Fort Worth, Jan. 14-16, 1946. The members assembled heard the following program:

Dr. I. P. Trotter, director, Extension Service, A. & M. College: "Applying Research to Rural Progress."

Drs. R. T. Dickinson, Dallas, and N. A. Cox, Lubbock: "Business Management of a Veterinary Practice."

Dr. F. G. Harbough, Lubbock: "Feeds and Feeding."

Dr. R. F. Bourne, Colorado A. & M. College, Ft. Collins: "Newer Drugs."

Drs. W. T. Hardy, Sonora, and F. P. Mathews, Amarillo: "Poisonous Plants."

Drs. Philip Smith, Abilene, and Verne Scott, Stephenville: "Conducting a Horse Practice."

Drs. R. Knight and W. A. Boney, College Station: "Conducting a Poultry Practice."

Dr. O. E. Wolfe, Big Spring: "Conducting a Beef Cattle Practice."

Dr. I. B. Boughton, Sonora: "New Diseases of Sheep and Goats."

Dr. H. Schmidt, College Station: "New Diseases of Cattle."

Dr. V. B. Robinson, College Station: "Conducting a Swine Practice."

Drs. L. M. Griffin, Amarillo, and H. V. Cardona, Fort Worth: "Conducting a Small Animal Practice."

Dr. A. A. Lenert, College Station: "Conducting a Dairy Practice."

Dr. R. D. Turk, College Station: "Developments in Control of Internal Parasites."

Dr. H. Shull, Texarkana: "Municipal Services a Veterinarian May Render."

Dr. H. L. Darby, Fort Worth: "Progress of Strain 19 in Controlling Brucellosis."

Dr. Dan Roberts, Wichita Falls: "Progress of Mastitis Control Program."

The president's address was delivered by Dr. Charles Koberg, San Angelo, and there was a question box and panel discussion on practice problems.

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Personal.—Dr. W. W. Armistead has been released from his post as commanding officer of the 643rd Veterinary Evacuation Detachment and has returned to his position as assistant professor of Veterinary Medicine and Surgery at A. & M. College.

Vermont

State Association.—The Vermont Veterinary Medical Association held its annual meeting at the University of Vermont, Burlington, on Jan. 26, 1946. Dr. David Walker, Morrisville, called the meeting to order and presided during the business session. In addition to the President's Address by Dr. Walker, Drs. J. F. Witter, University of Maine, Orono, and R. A.

McIntosh, Ontario Veterinary College, Guelph, appeared on the program. Guest speaker at the dinner was William Brown, M. D., dean of the College of Medicine, University of Vermont. Dr. Brown, a lieutenant colonel in the Medical Corps, served as a liaison medical officer with the American and British Armies in Greece. He related some of his experiences abroad.

s/G. N. WELCH, *Secretary-Treasurer.*

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Personal.—Dr. G. N. Welch (Ont., '03) and Mrs. Welch, Northfield, departed on February 6 by auto, to spend an extended vacation in Florida.

Virginia

State Association.—The Virginia State Veterinary Medical Association met at the John Marshall Hotel in Richmond, January 28-30, 1946. The meetings were well attended and the informative program presented included:

Dr. James Farquharson, Colorado State College, Fort Collins, president of the AVMA: "Surgical Technics."

Dr. Frank Thorp, Jr., Michigan State College, East Lansing: "Pyelonephritis in Cattle" and "Diseases of Sheep."

Dr. G. Dikmans, Animal Research Center, Beltsville, Md.: "Anaplasmosis in Cattle."

Dr. A. G. Danks, Cornell University Ithaca, N. Y.: "Calf and Cattle Diseases and Treatments."

Dr. George H. Hopson, De Laval Co., New York City: "Mastitis Control."

Others appearing on the program were: Mr. W. L. Bendix, State Department of Animal Industry, Richmond; Dr. F. E. Mullen, State Diagnostic Laboratories, Harrisonburg; Dr. E. P. Johnson, Agricultural Experiment Station, Blacksburg; Dr. W. H. Ellett, Midlothian; and Dr. Mark Welsh, Lederle Laboratories, Pearl River, N. Y.

Officers of the Association for the year 1946 are: Drs. C. R. Pastors, Staunton, *president;* E. P. Johnson, Blacksburg, *first vice-president;* Ray D. Hatch, Blacksburg, *secretary;* A. J. Sipos, Richmond, *treasurer.*

s/RAY D. HATCH, *Secretary.*

Washington

Junior AVMA Chapter.—The Washington State College student chapter of the AVMA has elected the following officers for the coming semester: Jay Wallis, *president* (reëlected); Donald Wasson, *vice-president;* Irene Woods, *secretary;* Rucker Innes, *treasurer.*

s/IRENE WOODS, *Secretary.*

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Personal.—Dr. F. A. Hunter has resigned his position with the Western Washington Experiment Station to join the staff of the Britton Veterinary Hospital, Tacoma.

Wisconsin

State Association.—The Wisconsin Veterinary Medical Association met at Madison, Jan. 30, to Feb. 1, 1946. The program included the following papers:

Dr. Donald Jasper, University of Minnesota, St. Paul: "Bovine Mastitis."

Dr. John J. Porter, University of Wisconsin, Madison: "Penicillin in the Treatment of Mastitis." This was discussed by Drs. L. T. Donovan, Waupun; M. D. Hutchinson, Clintonville; and G. W. Jensen, Antioch, Ill.

Dr. V. S. Larson, Madison: "Report of Director of Livestock Sanitation."

Dr. A. H. Quin, Jensen-Salsbery Laboratories, Kansas City, Mo.: "The Business Side of Veterinary Practice." Discussion led by Drs. E. W. Krueger, Evansville; and Sam Elmer, Richland Center.

Dr. W. Wisnicky, Fond du Lac: "Handling Dairy Herds Infected with Trichomoniasis." Discussion led by Drs. John Schwab, Oconomowoc; and George Gettleman, Hartford.

Dr. L. P. Doyle, Purdue University, Lafayette, Ind.: "Swine Diseases." Discussion led by Drs. V. S. Jacoby, Watertown; and R. P. Hippenbecker, Fennimore.

Dr. J. V. Lacroix, Evanston, Ill.: "Small Animal Practice." Discussion led by Drs. C. M. Heth, La Crosse, and F. W. Milke, Milwaukee.

Dr. E. M. Baldwin, Corn States Serum Company, Omaha, Neb.: "Infectious Keratitis of Cattle." Discussion led by Drs. Robert Curtiss, Portage, and John Ehlenfeldt, Waterloo.

Dr. T. H. Ferguson, Lake Geneva: "Cowpox." Discussion led by Drs. A. J. Knilans, Janesville, and O. S. Phelps, Beaver Dam.

A film on "Lameness in Horses" by Dr. James Farquharson, Fort Collins, Colo., was discussed by Drs. E. Boesewetter, West Bend, and W. Nolecheck, Thorp.

Rev. T. Parry Jones was guest speaker at the banquet.

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Dr. Brandly Accepts New Position.—Dr. C. A. Brandly (K.S.C., '23) has been released from his duties as director of the War Research Project in the Department of Comparative Pathology and Tropical Medicine, Harvard Medical School, Boston, Mass., by termination of this work. He has accepted the professorship of Veterinary Science and Agricultural Bacteriology, University of Wisconsin, Madison. Dr. Brandly is widely known for his work in the bacteriology and virology of animal diseases, and he is a member of the Research Council of the AVMA.

Foreign

France

Treatise on General Zoötechnics.—A work on zoötechnics in seven volumes is about to be published for the veterinary school curriculum of France. The author is Professor Marcel Jean-Blain. The subject matter is divided into the following volumes: General Genetics; Sexuality and Reproduction; Alimentation of Domestic Animals; Influence of Soil, Climate, and Work on Domestic Animals; Individuality, Breed, and Methods of Reproduction; The Production of Milk; The Production of Meat; and The Production of Wool.

The vast scope of this literary task is shown by a review of volume I by the author for the Academy of Veterinary Medicine (*Bull. Acad. Vét. de France, 18*, (Oct., 1945): 226-228). Its ten chapters are titled: (1) Substratum of Heredity. (2) and (3) Mendelism. (4) The Chromosome Theory of Heredity. (5) Mutation. (6) Fluctuation. (7) The Mathematics of Variability. (8) The Heredity of Acquired Characters. (9) Pathological Heredity. (10) Telegony.

The volume does not pretend to cover the whole field of genetics. Its limitation is "practical genetics" applicable to efficacious animal production. The prodigious task is signalized here to point out a major in veterinary education that is left out of the veterinary college curriculum in English speaking countries and turned over to nonveterinary personnel to develop and apply in the field of animal culture.

Peru

Horses for Peruvian Army.—Col. Russell McNellis (I.S.C., '28), who is stationed at Lima, Peru, with the United States Military Mission, has recently completed an extended trip in Chile for the purpose of purchasing horses for the Peruvian army.

COMING MEETINGS

American Society of Parasitologists. Municipal Auditorium, St. Louis, Mo., March 28-30, 1946. James T. Culbertson, secretary.

Conference on Bovine Brucellosis. Baltimore, Md., April 9-10, 1946. A. L. Brueckner, Live Stock Sanitary Service, 816 Fidelity Bldg., Baltimore 1, Md.

American Animal Hospital Association. Hotel Pennsylvania, New York, N. Y., April 16-18, 1946. R. E. Ruggles, P. O. Box 303, Moline, Ill., secretary.

Eastern Iowa Veterinary Association, Inc. Hotel Montrose, Cedar Rapids, Iowa, Oct. 15-16, 1946. C. C. Graham, Wellsburg, Iowa, secretary.

American Public Health Association. Cleveland, Ohio, the week of November 11, 1946.

Chicago Veterinary Medical Association. Palmer House, Chicago, Ill., the second Tuesday of each month. Robert C. Glover, 1021 Davis St., Evanston, Ill., secretary.

New York City Association. Hotel Pennsylvania, New York, N. Y., the first Wednesday of each month. C. R. Schroeder, Lederle Laboratories, Inc., Pearl River, N. Y., secretary.

STATE BOARD EXAMINATIONS

Massachusetts—The Massachusetts Board of Registration in Veterinary Medicine will hold examinations for registration in this state on April 16-18, 1946, at the State House, Boston. The latest date for filing applications is April 2, 1946. Address inquiries to Dr. B. S. Killian, secretary of the board, Room 413-N, State House, Boston 33, Mass.

DEATHS

N. E. Grubser (C. V. C., '11), 57, Earlham, Iowa, died Oct. 18, 1945. Born in Clinton County, Ill., in 1888, he entered practice at Earlham soon after graduating. He retired from active practice in 1939 on account of failing vision and thereafter devoted his time to the development of the Adel Sales Pavilion.

L. M. Heath (Ont., '21), 53, Victoria, B. C., died in January, 1945. Dr. Heath was admitted to the AVMA in 1923.

A. H. Ide (Ont., '89), Lowville, N. Y., died Jan. 19, 1946. Dr. Ide had been a member of the AVMA since 1913.

R. F. Kelso (C. V. C., '10), 58, of Sewal, Iowa, died Nov. 12, 1945, after a prolonged illness. Since 1918, Dr. Kelso has engaged in farming on a large scale and his death occurred at the farm on which he was born in 1885. He had practiced at Corydon, Allerton, and Seymour, Iowa.

W. J. Lembke (San Fran., '18), Arcata, Calif., died Sept. 18, 1945. Dr. Lembke was employed for twenty-three years as field veterinarian and meat inspector by the state of California. He retired Jan. 1, 1945, because of ill health.

S. R. Price (C. V. C., '10), 61, Effingham, Ill., died Feb. 10, 1946. Dr. Price was admitted to the AVMA in 1941.

R. V. Taylor (McK., '08), 71, San Angelo, Tex., died Dec. 31, 1944. Dr. Taylor was admitted to the AVMA in 1920.

THE VETERINARY PROFESSION AND THE WAR

Carlisle Barracks' Medical Activities Moved to Fort Sam Houston

Carlisle Barracks, a center for Army Medical Department training for a quarter of a century and where many veterinary officers have been given basic courses since the last war, will discontinue its medical activities about March 15, 1946, according to a recent announcement by Surgeon General Kirk. These activities will be moved to Fort Sam Houston, Texas, where a concentration of Medical Department schools and courses will be made. In addition to the basic officers' course, plans are being made for training of about 5,000 men in technician schools at the new center.

Carlisle Barracks is one of the oldest military stations in the country. It was established by the British during the French and Indian War and has a rich historical background. War Department plans call for its continuation as an Army post and as the location for the Army Information School.

Annual Report, Army Service Forces, 1945

Following are excerpts from the published annual report of the Commanding General, Army Service Forces, for the fiscal year 1945.

During the calendar year 1944, the Veterinary Corps inspected the largest volume of meat, meat food, and dairy products in the history of the Army—8,222,504,543 lb. Much of it was highly perishable. There were no widespread diseases among troops traceable to issue of unwholesome meat, meat food, and dairy products.

The financial interests of the United States were protected by the rejection of $27,460,000 worth of food failing to meet army specifications. Over 50 million pounds of powdered eggs were procured for the Armed Forces in 1944.

The daily average number of horses and mules of the entire Army in 1944 was 43,334; this number included animals used in Italy and the India-Burma-China theaters. All shipments were completed with exceptionally few losses, and with animals in excellent condition. Army horses and mules were completely protected against encephalomyelitis for the sixth consecutive year. The incidence of influenza, strangles, and respiratory diseases continued at a low level.

On Jan. 1, 1945, the dog strength of the Army was 4,118. All dogs accepted for duty were protected against rabies, and if under two years old, against distemper. Some 10,000 cases of rabies were reported among civilian-owned animals, but not 1 case developed among army animals.

Awards and Citations

The Adjutant General's Office recently announced the award of the Distinguished Service Medal to Brig. General R. A. Kelser, now retired and new dean at the School of Veterinary Medicine, University of Pennsylvania. The citation stated that General Kelser "discharged the responsibilities of Director of the Veterinary Division, Surgeon General's Office, with distinction from May 1938 to August 1945. He displayed superior leadership and foresight in expanding the Veterinary Corps and skillfully administering it throughout the war. Through his unusual executive ability and initiative he contributed in important measure to the success of our military forces."

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The Veterinary Detachment of the Chicago Quartermaster Depot has been awarded the Meritorious Service Unit Plaque in recognition of its work in meat and dairy inspection for the Armed Forces during World War II.

During the war, the unit expanded from its peacetime strength of two officers and five enlisted men to become the largest veterinary outfit in the Army—reaching a peak strength of 72 officers and 171 enlisted men on duty in Chicago and throughout Michigan, Wisconsin, and Illinois, inspecting foods of animal origin for the Army, Navy, Marine Corps, Coast Guard, Veterans' Administration, War Shipping Administration, and other Government agencies. The monthly prewar average of meat and dairy products inspected by the unit was 9,680,000 lb., and this rose to a peak in July, 1945, of more than 205 million pounds.

The detachment includes the Meat and Dairy Hygiene School, where more than 900 Veterinary Corps Officers received advanced training in meat and dairy inspection during the emergency period.

The Plaque was presented to Col. Frank M. Lee, Depot Veterinarian by Brig. Gen. Raymond A. Kelser, Chief of Veterinary Service, Surgeon General's Office, in a ceremony at the Depot

Veterinary Officers Retired

The Office of the Surgeon General reports that the following Veterinary Corps officers of the Regular Army are to be retired on the dates specified, and submits a brief record of service for each officer.

Colonel Elwood L. Nye was born March 26, 1892, at Rigby, Utah. He received his degree of Doctor of Veterinary Medicine from Colorado Agriculture College in 1914, and accepted a commission as second lieutenant, Veterinary Corps, April 3, 1917, and was promoted through the grades, attaining the permanent rank of colonel March 24, 1943. Colonel Nye's first assignment upon entering the service was in the Hawaiian Department. Upon his return in 1920, he was assigned to duty at the Presidio of San Francisco, Calif., thence to Fort Brown, Texas. In 1926, Colonel Nye was assigned to the Surgeon General's Office, Washington, D. C., as assistant to the chief of the Veterinary Division, and upon completion of this tour of duty he was again assigned to the Presidio of San Francisco. Colonel Nye served at Fort Meade, S. Dak., from 1935 to 1939, and at West Point, N. Y., from 1939 to 1942, when he was assigned to Fort Lewis, Wash. He is an honor graduate of the Army Veterinary School, class of 1920; the basic course, Medical Field Service School, Carlisle Barracks, Pa., class of 1930, where he received the Skinner Medal for the highest general standing. Colonel Nye will be on duty at Carlisle Barracks, Pa., at the time of his retirement for physical disability on 31 January, 1946.

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Colonel Fred C. Waters was born April 16, 1887. He received his degree of Doctor of Veterinary Medicine from The Ohio State University in 1912, and was commissioned a second lieutenant in the Veterinary Reserve Corps on July 5, 1917, and ordered to active duty at Fort Oglethorpe, Ga., on 30 July, 1917. In June, 1919, Colonel Waters was transferred to ARD 329, Camp Travis, Texas, where he served one year. Following duty at Fort Reno Okla., and Fitzsimons General Hospital, from 1920 to 1921, he was sent to the Philippine Department. In 1922, while still on foreign service, he was assigned to duty as veterinarian with the China expedition. Upon his return to the United States in 1923, he was assigned to duty at Camp S. D. Little, Arizona. In 1929, he was transferred to Presidio at Monterey, California. Following duty at Seattle Quartermaster Depot, from 1931 to 1938, Colonel Waters was again assigned to duty in the Philippine Department where he served two years. Upon his return to the United States in 1940, he was assigned to duty as Depot Veterinarian, Chicago Quartermaster Depot, at which station he was serving at the time of his retirement. Colonel Waters is a graduate of the Army Veterinary School, and the Medical Field Service School, Carlisle Barracks, Pa., class of 1929. He attained the permanent rank of colonel on July 30, 1943. He will be retired on 31 January, 1946, for physical disability.

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Colonel Kenneth E. Buffin was born at Williamsburg, Va., July 10, 1888. He received his degree of Doctor of Veterinary Medicine from George Washington University in 1916. He was commissioned a second lieutenant in the Veterinary Reserve Corps May 15, 1917, and called to active duty June 11, 1917. From 1917 to 1921, Colonel Buffin served on short tours of duty at various stations within the United States. In 1921, he was assigned to Camp Travis, Texas, where he served three years. Following duty at Fort Meade, S. Dak., and Fort Des Moines, Iowa, from 1924 to 1928, he was assigned to the Philippine Department. Upon his return to the United States in 1930, he was assigned to duty at Fort Sam Houston, Texas. In 1935, Colonel Buffin was assigned to Carlisle Barracks, Pa., where he served until 1939 when he was sent to the Hawaiian Department for a tour of duty. In 1941, upon his return from foreign service, he was assigned to Fort Belvoir, Va. Colonel Buffin is a graduate of the Army Veterinary School, 1929; the Medical Field Service School basic course, 1929, advance course, 1936. He attained the rank of colonel on June 11, 1943, and will be on duty at Camp Blanding, Fla., at the time of his retirement for physical disability on 31 January, 1946.

March is Red Cross Month

Veterinary Officers Separated from Military Service

Alabama

Hamner, Eugene P.
Kendall, Hunter E.
Sugg, Redding S.
Wann, Russell S.
Wendell, Carl E.

California

Bowers, F. U.
DeLay, Paul D.
Garrett, Thomas W.
George, Eugene W.
Harrison, Earl H.
Lacey, Lee T.
McDonald, Ian C.

Colorado

Beggs, William E.
Bohlender, I. N.
Hester, Kenneth J.

Connecticut

Glassman, A. N.
Pieper, Niels W.

Washington, D. C.

Locke, Robert F.
Miller, Howell D.
Ruebush, E. E.

Florida

Balthaser, B. F., Jr.
Dee, Clarence E.

Georgia

Ramsey, James D.
Wesley, Joseph L.

Idaho

Merchant, W. R.
Nichols, W. C.

Illinois

Crawford, J. P.
Kragness, T. A.
Prendergast, W. B.
Whiteman, C. E.

Indiana

Allen, Bertram V.
Hoskins, Robert J.
Moore, Morris E.

Iowa

Blackburn, L. C.
Bolks, Herbert P.
Germanio, P. J.
Holen, Borg D.
Morgan, Richard B.
Robinson, C. E.
Sours, Calvin D.
Sparks, Quinton W.
Theophilus, D. K.
Timms, Walter H.
Todd, Guy H.
Zimdahl, R. O.

Kansas

Bender, Henry A.
Farris, Merle L.
Prather, Elwin R.
Smith, William D.

Kentucky

Taylor, Edgar L.

Louisiana

Broussard, Geo. P.
Franks, R. D.
Ward, Benj. F.

Maryland

Knudson, R. L.
McClure, John F.

Massachusetts

Carlin, Max H.
Mason, Marcus M.
Young, John R.

Michigan

Davidson, J. L.
Dawe, Louis T.
Green, Arthur L.
Henshaw, Milo J.
Howe, Nelson S., Jr.
Jones, Leon V.
Klooster, Melvin J.
Smith, Claude A.

Minnesota

Eder, Everett P.
Hughes, Leland S.
Klaus, Kenneth W.
Moen, Leonard A.

Mississippi

Moses, Clyde R.
Randle, John Allen

Missouri

Berger, Joseph H.
Druley, Vincent Y.
Farney, Joseph A.

Nebraska

Jenkins, Oliver L.
Johnson, S. E.
Murphy, E. A.
Worthman, R. P.

New Hampshire

Durant, Leslie

New Jersey

Coane, Milton D.
McPeek, Raymond C.
Relken, Walter E.

New York

Allen, Robert O.
Ayres, John P.
Ehrlich, David
Erdheim, Morris
Foster, Edwin N.
Hickey, Thomas E.
Hughes, Donald V.
Nathanson, Sidney
Papish, Philip G.
Young, G. A., Jr.

North Carolina

Mauney, Jacob P.
Rogers, A. B.

Ohio

Badger, Max G.
Boydston, J. L.
Brandehoff, A. J.
Elsasser, D. S.
Henson, Ben S.
Pavey, William H.
Price, L. W.
Smith, K. W.

Oklahoma

Bennett, C. K.
Cook, Victor J.

Oregon

Erickson, Kenneth
McMichael, W. W.
Stevens, Blair A.

Pennsylvania

Emas, Jack R.
McKee, Graydon S.
Newhart, Charles C.
Sullivan, F. C.
Swarts, A. L.

Tennessee

Gathmann, R. A.
Hill, Howard E.

Texas

Anderson, R. J., Jr.
Barrett, C. D.
Burrus, Marvin M.
Fisherman, Henry
Hartman, R. H.
Jackson, Lewis L.
Ramsey, E. Wm.
Rogers, Willie T.
Ward, Drue S.
Zahn, Charles W.

Utah

Flint, Jean C.
Gold, Russel W.
Mencimer, F. R.

Virginia

Eggert, Matthew J.
Thompson, E. E.
Williams, W. J.

Washington

Arron, Daniel P.
Eshelman, Claude A.
Halverson, O. J.
Marlowe, H. M.
Newman, L. L.

West Virginia

Fallon, Harry J.

Wisconsin

Abbott, John E.
Harries, C. E.
Hendricks, S. L.
Nelson, Marvin L.
Schubert, Carl J.
Schwiesow, C. W.